

Chapter 4. U.S. and International Research and Development: Funds and Alliances

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Appendix table 4-1.

Gross domestic product and GDP implicit price deflators: 1960-99

	Gross domestic product (Billions of dollars)		GDP price deflator (1992 = 1.000)	
	Calendar year	Fiscal year	Calendar year	Fiscal year
1960	526.6	518.3	0.233	0.233
1961	544.8	530.4	0.236	0.237
1962	585.2	567.3	0.239	0.239
1963	617.4	599.0	0.242	0.242
1964	663.0	639.8	0.246	0.245
1965	719.1	686.8	0.250	0.249
1966	787.8	752.7	0.257	0.255
1967	833.6	811.9	0.266	0.263
1968	910.6	868.0	0.277	0.273
1969	982.2	948.1	0.290	0.285
1970	1,035.6	1,009.4	0.306	0.300
1971	1,125.4	1,077.4	0.321	0.316
1972	1,237.3	1,177.0	0.335	0.331
1973	1,382.6	1,306.8	0.354	0.345
1974	1,496.9	1,438.1	0.385	0.370
1975	1,630.6	1,554.5	0.422	0.408
1976	1,819.0	1,730.4	0.446	0.437
1977	2,026.9	1,971.4	0.475	0.470
1978	2,291.4	2,212.6	0.509	0.503
1979	2,557.5	2,495.9	0.553	0.545
1980	2,784.2	2,718.9	0.604	0.593
1981	3,115.9	3,049.1	0.661	0.652
1982	3,242.1	3,211.3	0.702	0.698
1983	3,514.5	3,421.9	0.732	0.730
1984	3,902.4	3,812.0	0.759	0.758
1985	4,180.7	4,102.1	0.786	0.784
1986	4,422.2	4,374.3	0.806	0.806
1987	4,692.3	4,605.1	0.831	0.829
1988	5,049.6	4,953.5	0.861	0.858
1989	5,438.7	5,351.8	0.897	0.894
1990	5,743.8	5,684.5	0.936	0.932
1991	5,916.7	5,858.8	0.973	0.972
1992	6,244.4	6,143.2	1.000	1.000
1993	6,553.0	6,470.8	1.026	1.026
1994	6,935.7	6,830.4	1.050	1.050
1995	7,253.8	7,186.9	1.076	1.076
1996	7,574.4	7,484.6	1.100	1.101
1997	7,957.7	7,859.8	1.129	1.129
1998	8,366.5	8,263.5	1.160	1.160
1999	8,790.2	8,681.4	1.191	1.191

NOTES: Data are projected for 1997-99 and are from the Mid-Session Review of the 1997 Budget, July 1996, updated for GDP revisions used in the President's 1998 budget.

SOURCES: U.S. Bureau of Economic Analysis, *Survey of Current Business* (Washington, DC: U.S. Department of Commerce, monthly series); and Office of Management and Budget, unpublished tabulations.

Appendix table 4-2.

Purchasing power parity and market exchange rates, by selected country: 1981-96

(Units of foreign currency per U.S. dollar)

	Purchasing power parities					Market exchange rates		
	Canada	France	Germany	Italy	Japan	United Kingdom	Germany	Japan
1981	1.26	5.62	2.37	878	238	0.519	2.26	221
1982	1.29	5.93	2.32	969	228	0.527	2.43	249
1983	1.30	6.26	2.30	1,073	223	0.534	2.55	238
1984	1.29	6.47	2.26	1,152	221	0.536	2.85	238
1985	1.28	6.62	2.23	1,213	218	0.549	2.94	239
1986	1.28	6.80	2.23	1,276	216	0.553	2.17	169
1987	1.30	6.79	2.20	1,314	210	0.563	1.80	145
1988	1.31	6.74	2.15	1,351	203	0.575	1.76	128
1989	1.32	6.68	2.10	1,376	199	0.590	1.88	138
1990	1.30	6.61	2.09	1,421	195	0.602	1.62	145
1991	1.29	6.53	2.10	1,467	194	0.637	1.66	135
1992	1.27	6.38	2.05	1,450	187	0.612	1.56	127
1993	1.26	6.57	2.10	1,534	184	0.637	1.65	111
1994	1.25	6.64	2.07	1,536	181	0.647	1.62	102
1995	1.23	6.62	2.07	1,589	176	0.670	1.43	94
1996	1.23	6.52	2.20	1,639	177	0.640	NA	NA

NA = not available

SOURCES: Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997); and International Monetary Fund, *International Financial Statistics Yearbook* (Washington, DC: 1996).

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Appendix table 4-3.
U.S. R&D expenditures, by performing sector and source of funds: 1970-97
 (Millions of current dollars)

Performing sector: Funding sector:	Total	Federal		Industry		Industry FFRDCS		Universities & colleges		U&C FFRDCS		Other nonprofit institutions		Non- profit Govt.		
	U.S.	Federal Govt.	Federal	Govt.	Federal	Govt.	Federal	Nonfed. govt.	Industry	U&C	Federal Govt. ^b	Total	Federal Govt.	Industry	Non- profit Govt.	
	Total	U.S.	Total	U.S.	Total	U.S.	Total	U.S.	Total	U&C	Federal Govt. ^b	Total	Federal Govt.	Industry	Non- profit Govt.	
<i>Calendar year^c</i>																
1970	26,235	4,154	17,594	7,306	10,288	473	2,376	1,666	228	63	251	168	732	677	410	95
1971	26,910	4,409	17,829	7,175	10,654	491	2,533	1,742	259	71	282	180	725	709	427	98
1972	28,661	4,676	19,004	7,469	11,535	548	2,694	1,843	276	77	308	191	769	771	472	101
1973	30,905	4,837	20,704	7,600	13,104	545	2,919	1,997	298	87	331	206	829	882	566	105
1974	33,238	5,133	22,239	7,572	14,667	648	3,119	2,096	314	100	380	229	896	995	639	115
1975	35,565	5,561	23,460	7,878	15,582	727	3,489	2,344	340	116	424	266	1,027	1,076	675	125
1976	39,314	5,890	26,107	8,671	17,436	890	3,814	2,566	367	127	463	292	1,206	1,162	711	135
1977	43,233	6,211	28,863	9,523	19,340	962	4,207	2,809	384	147	541	325	1,467	1,248	740	150
1978	48,582	6,962	32,222	10,107	22,115	1,082	4,810	3,194	429	176	651	361	1,772	1,402	830	165
1979	55,269	7,471	37,062	11,354	25,708	1,164	5,540	3,723	477	204	760	377	2,013	1,629	985	180
1980	63,076	7,831	43,228	12,752	30,476	1,277	6,259	4,216	505	250	877	411	2,306	1,700	1,000	200
1981	72,190	8,605	50,425	14,997	35,428	1,385	6,966	4,620	564	303	1,031	449	2,484	1,788	1,038	225
1982	80,633	9,501	57,166	17,061	40,105	1,484	7,464	4,823	619	350	1,159	512	2,544	1,950	1,175	250
1983	89,742	10,830	63,683	19,095	44,588	1,585	8,067	5,100	642	411	1,329	585	2,840	2,138	1,313	275
1984	101,940	11,916	73,061	21,657	51,404	1,739	8,887	5,589	706	496	1,463	633	3,243	2,470	1,550	325
1985	114,344	13,093	82,376	25,333	57,043	1,863	9,997	6,226	793	595	1,680	704	3,616	2,736	1,700	375
1986	119,907	13,504	85,932	26,000	59,932	1,891	11,234	6,870	942	723	1,944	756	3,973	2,835	1,700	425
1987	125,841	13,588	90,160	28,757	61,403	1,995	12,481	7,556	1,044	811	2,215	855	4,287	2,828	1,569	525
1988	133,463	14,342	94,893	28,221	66,672	2,122	13,841	8,392	1,135	903	2,441	969	4,581	3,174	1,762	501
1989	141,550	15,231	99,860	26,359	73,501	2,195	15,303	9,152	1,248	1,028	2,774	1,101	4,756	3,658	2,062	562
1990	151,655	16,404	107,404	25,802	81,602	2,323	16,610	9,785	1,361	1,147	3,096	1,220	4,894	4,117	2,346	625
1991 ^d	160,521	15,249	114,675	24,095	90,580	2,277	17,892	10,447	1,478	1,224	3,412	1,333	5,120	4,611	2,679	680
1992	164,932	15,853	116,757	22,369	94,388	2,353	19,099	11,306	1,508	1,300	3,558	1,428	5,259	4,864	2,806	716
1993	165,188	16,532	115,435	20,844	94,591	1,965	20,221	12,129	1,561	1,376	3,646	1,510	5,289	4,997	2,841	737
1994	168,554	16,440	117,392	20,261	97,131	2,202	21,305	12,826	1,588	1,437	3,867	1,585	5,305	5,152	2,899	764
1995	183,013	17,231	129,830	21,178	108,652	2,273	22,303	13,434	1,670	1,516	4,069	1,613	5,405	5,167	2,822	830
1996 prelim.	193,206	16,774	139,579	20,931	118,648	2,273	23,134	13,855	1,736	1,613	4,255	1,676	5,405	5,340	2,871	895
1997 prelim.	205,742	16,450	151,418	20,787	130,631	2,273	24,031	14,285	1,821	1,710	4,457	1,759	5,405	5,520	2,900	967

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector; R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^dDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-2, 4-6, and 4-7.

**Appendix table 4-4.
U.S. R&D expenditures, by performing sector and source of funds: 1970-97**
(Millions of constant 1992 dollars)

Performing sector: Funding sector:	Total	Federal	Industry	Industry FFRDCs		Universities & colleges			U&C FFRDCs		Other nonprofit institutions		Nonprofit FFRDCs	
	U.S.	Federal Govt.	Industry	Federal	Govt.	Federal Govt.	Nonfed. govt.	Industry	U&C	Non- profit	Federal	Industry	Non- profit	Federal
	Total	Federal	Total	Federal	Govt.	Total	Federal	Govt.	Total	Federal	Total	Federal	Industry	Non- profit
Calendar year ^c														
1970	85,842	13,590	57,568	23,906	33,663	1,548	7,775	5,452	746	207	820	550	2,394	2,214
1971	83,719	13,715	55,468	22,322	33,146	1,528	7,879	5,419	804	221	877	558	2,256	2,204
1972	85,531	13,953	56,713	22,290	34,424	1,635	8,038	5,499	822	228	920	569	2,295	2,299
1973	87,361	13,672	58,526	21,483	37,042	1,541	8,250	5,644	843	245	934	583	2,343	2,493
1974	86,273	13,322	57,723	19,654	38,069	1,682	8,095	5,440	815	258	987	594	2,324	2,581
1975	84,358	13,191	55,645	18,686	36,959	1,724	8,276	5,560	806	274	1,006	630	2,436	2,552
1976	88,114	13,202	58,514	19,434	39,079	1,995	8,547	5,750	821	285	1,038	655	2,704	2,604
1977	91,091	13,087	60,813	20,064	40,748	2,027	8,863	5,919	809	309	1,140	685	3,091	2,630
1978	95,404	13,672	63,276	19,848	43,428	2,125	9,446	6,272	841	345	1,278	709	3,479	2,753
1979	100,009	13,519	67,064	20,545	46,519	2,106	10,025	6,737	863	369	1,375	682	3,642	2,948
1980	104,464	12,969	71,593	21,120	50,474	2,115	10,366	6,983	836	414	1,453	681	3,819	2,816
1981	109,294	13,027	76,343	22,705	53,637	2,097	10,547	6,995	853	458	1,561	680	3,761	2,706
1982	114,847	13,533	81,423	24,300	57,122	2,114	10,630	6,870	881	499	1,650	730	3,623	2,777
1983	122,613	14,796	87,009	26,089	60,920	2,166	11,021	6,967	877	561	1,816	800	3,881	2,920
1984	134,224	15,689	96,199	28,516	67,683	2,290	11,701	7,359	929	653	1,926	834	3,252	2,470
1985	145,559	16,667	104,864	32,249	72,615	2,372	12,726	7,926	1,009	757	2,139	896	4,603	3,483
1986	148,786	16,757	106,629	32,262	74,367	2,346	13,940	8,524	1,169	897	2,412	938	4,930	3,518
1987	151,499	16,359	108,543	34,620	73,923	2,402	15,025	9,096	1,257	976	2,667	1,029	5,161	3,405
1988	155,002	16,657	110,207	32,775	77,432	2,464	16,075	9,747	1,318	1,048	2,835	1,125	5,320	3,686
1989	157,761	16,975	111,297	29,378	81,919	2,446	17,056	10,200	1,391	1,146	3,092	1,227	5,300	4,077
1990	161,957	16,736	114,700	27,555	87,145	2,481	17,738	10,450	1,454	1,225	3,307	1,303	5,226	4,397
1991 ^d	164,940	15,669	117,832	24,758	93,073	2,340	18,385	10,734	1,518	1,257	3,506	1,369	5,261	4,738
1992	164,932	15,853	116,757	22,369	94,388	2,353	19,099	11,306	1,508	1,300	3,558	1,428	5,259	4,864
1993	160,977	16,111	112,492	20,313	92,180	1,915	19,705	11,820	1,521	1,340	3,553	1,471	5,154	4,870
1994	160,592	15,663	111,847	19,304	92,543	2,098	20,298	12,220	1,513	1,369	3,685	1,510	5,054	4,909
1995	170,142	16,019	120,699	19,689	101,011	2,113	20,734	12,489	1,553	1,410	3,783	1,500	5,025	4,804
1996 prelim.	175,610	15,246	126,867	19,025	107,842	2,066	21,027	12,593	1,578	1,466	3,867	1,523	4,913	4,854
1997 prelim.	182,217	14,569	134,105	18,410	115,695	2,013	21,283	12,652	1,612	1,515	3,947	1,557	4,787	4,889

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources*: 1998 (Arlington, VA: forthcoming).

^aIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^dDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources*: 1997 Data Update, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources*: 1998 (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-5, 4-6, 5-1, and 5-2.

Appendix table 4-5.
U.S. R&D expenditures, by source of funds and performer: 1970-97
 (Millions of current dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit				Industry				Nonprofit			
	Total U.S.	Federal Govt.	Industry	FFRDCS	U&C	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	U&Cs	Total	Non-profit	U&Cs	U&Cs	
<i>Calendar year^d</i>																	
1970	26,235	14,970	4,154	7,306	473	1,666	732	410	230	10,446	10,288	63	95	251	340	172	
1971	26,910	15,183	4,409	7,175	491	1,742	725	427	215	10,823	10,654	71	98	282	364	184	
1972	28,661	15,976	4,676	7,469	548	1,843	769	472	200	11,713	11,535	77	101	308	389	198	
1973	30,905	16,563	4,837	7,600	545	1,997	829	566	190	13,296	13,104	87	105	331	417	211	
1974	33,238	17,193	5,133	7,572	648	2,096	896	639	210	14,882	14,667	100	115	380	470	241	
1975	35,565	18,437	5,561	7,878	727	2,344	1,027	675	225	15,823	15,582	116	125	424	542	276	
1976	39,314	20,179	5,890	8,671	890	2,566	1,206	711	245	17,698	17,436	127	135	463	608	316	
1977	43,233	21,988	6,211	9,523	962	2,809	1,467	740	275	19,637	19,340	147	150	541	683	358	
1978	48,582	24,279	6,962	10,107	1,082	3,194	1,772	830	333	22,456	22,115	176	165	651	768	407	
1979	55,269	27,100	7,471	11,354	1,164	3,723	2,013	985	390	26,092	25,708	204	180	760	841	464	
1980	63,076	29,857	7,831	12,752	1,277	4,216	2,306	1,000	475	30,926	30,476	250	200	877	911	500	
1981	72,190	33,666	8,605	14,997	1,385	4,620	2,484	1,038	538	35,956	35,428	303	225	1,031	974	525	
1982	80,633	37,113	9,501	17,061	1,484	4,823	2,544	1,175	525	40,705	40,105	350	250	1,159	1,037	525	
1983	89,742	41,362	10,830	19,095	1,585	5,100	2,840	1,313	600	45,274	44,588	411	275	1,329	1,135	550	
1984	101,940	46,319	11,916	21,657	1,739	5,589	3,243	1,550	625	52,225	51,404	496	325	1,463	1,228	595	
1985	114,344	52,493	13,093	25,333	1,863	6,226	3,616	1,700	663	58,013	57,043	595	375	1,680	1,365	661	
1986	119,907	54,475	13,504	26,000	1,891	6,870	3,973	1,700	538	61,079	59,932	723	425	1,944	1,466	710	
1987	125,841	58,254	13,588	28,757	1,995	7,556	4,287	1,569	501	62,669	61,403	811	456	2,215	1,658	803	
1988	133,463	59,930	14,342	28,221	2,122	8,392	4,581	1,762	510	68,076	66,672	903	501	2,441	1,880	911	
1989	141,550	60,301	15,231	26,359	2,195	9,152	4,756	2,062	547	75,091	73,501	1,028	562	2,774	2,136	1,035	
1990	151,655	61,456	15,671	25,802	2,323	9,785	4,894	2,346	636	83,374	81,602	1,147	625	3,096	2,367	1,147	
1991 ^e	160,521	60,563	15,249	24,095	2,277	10,447	5,120	2,679	696	92,484	90,580	1,224	680	3,412	2,585	1,252	
1992	164,932	60,693	15,853	24,369	2,353	11,306	5,259	2,806	748	96,404	94,388	1,300	716	3,558	2,770	1,342	
1993	165,188	60,350	16,532	20,844	1,965	12,129	5,289	2,841	749	97,704	94,591	1,376	737	3,646	2,928	1,419	
1994	168,554	60,692	16,440	20,261	2,202	12,826	5,305	2,899	759	99,332	97,131	1,437	764	3,867	3,074	1,489	
1995	183,013	63,147	17,231	21,178	2,273	13,434	5,405	2,822	804	110,998	108,652	1,516	830	4,069	3,129	1,516	
1996 prelim. ...	193,206	62,810	16,774	20,931	2,273	13,855	5,405	2,871	702	121,156	118,648	1,613	895	4,255	3,250	1,575	
1997 prelim. ...	205,742	62,745	16,450	20,787	2,273	14,285	5,405	2,900	644	133,308	130,631	1,710	967	4,457	3,411	1,653	

FFRDCS = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next update of these data, covering the years 1953-98, along with methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCS administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series). See text table 4-1 and figures 4-1, 4-2, 4-3, 4-7, 4-8, 5-1, and 5-2.

**Appendix table 4-6.
U.S. R&D expenditures, by source of funds and performer: 1970-97**
(Millions of constant 1992 dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit				Nonprofit			
	Total U.S.	Federal Govt.	Industry	FFRDCS	U&C	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	U&Cs	Non-profit
<i>Calendar year^d</i>													
1970	85,842	48,982	13,590	23,906	1,548	5,452	2,394	1,340	753	34,181	33,663	207	311
1971	83,719	47,236	13,715	22,322	1,528	5,419	2,256	1,327	669	33,146	221	305	877
1972	85,531	47,675	13,953	22,290	1,635	5,499	2,295	1,407	597	34,953	34,424	228	301
1973	87,361	46,821	13,672	21,483	1,541	5,644	2,343	1,600	537	37,584	37,042	245	297
1974	86,273	44,625	13,322	19,654	1,682	5,440	2,324	1,657	545	38,626	38,069	258	298
1975	84,358	43,732	13,191	18,686	1,724	5,560	2,436	1,601	534	37,530	36,959	274	296
1976	88,114	45,227	13,202	19,434	1,995	5,750	2,704	1,594	549	39,666	39,079	285	303
1977	91,091	46,328	13,087	20,064	2,027	5,919	3,091	1,560	579	41,374	40,748	309	316
1978	95,404	47,678	13,672	19,848	2,125	6,272	3,479	1,630	653	44,099	43,428	345	324
1979	100,009	49,037	13,519	20,545	2,106	6,737	3,642	1,782	706	47,213	46,519	369	326
1980	104,464	49,448	12,969	21,120	2,115	6,983	3,819	1,656	787	51,219	50,474	414	331
1981	109,294	50,970	13,027	22,705	2,097	6,995	3,761	1,571	814	54,436	53,637	458	341
1982	114,847	52,861	13,533	24,300	2,114	6,870	3,623	1,674	748	57,977	57,122	499	356
1983	122,613	56,512	14,796	26,089	2,166	6,967	3,881	1,793	820	61,857	60,920	561	376
1984	134,224	60,988	15,689	22,290	7,359	6,516	4,270	2,041	823	68,764	67,683	653	428
1985	145,559	66,824	16,667	32,249	2,372	7,926	4,603	2,164	843	73,850	72,615	757	747
1986	148,786	67,756	16,757	32,262	2,346	8,524	4,930	2,109	667	75,790	74,367	897	527
1987	151,499	70,131	16,359	34,620	2,402	9,096	5,161	1,889	604	75,447	73,923	976	548
1988	155,002	69,602	16,657	32,775	2,464	9,747	5,320	2,047	592	79,062	77,432	1,048	582
1989	157,761	67,207	16,975	29,378	2,446	10,200	5,300	2,298	610	83,691	81,919	1,146	626
1990	161,957	65,631	16,736	27,555	2,481	10,450	5,226	2,505	679	89,038	87,145	1,225	667
1991 ^e	164,940	62,230	15,669	24,758	2,340	10,734	5,261	2,753	715	95,030	93,073	1,257	699
1992	164,932	60,693	15,853	22,369	2,353	11,306	5,259	2,806	748	96,404	94,388	1,300	716
1993	160,977	58,811	16,111	20,313	1,915	11,820	5,154	2,769	730	94,238	92,180	1,340	718
1994	160,592	57,825	15,663	19,304	2,098	12,220	5,054	2,762	724	94,640	92,543	1,369	728
1995	170,142	58,706	16,019	19,689	2,113	12,489	5,025	2,623	747	103,192	101,011	1,410	772
1996 prelim.	175,610	57,090	15,246	19,025	2,066	12,593	4,913	2,609	638	110,121	107,842	1,466	813
1997 prelim.	182,217	55,571	14,569	18,410	2,013	12,652	4,787	2,569	571	118,066	115,695	1,515	856

FFRDCS = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of FFRDC expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming)

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-1, 4-4, 5-1, and 5-2.

Appendix table 4-7.
U.S. basic research expenditures, by performing sector and source of funds: 1970-97
 (Millions of current dollars)

Performing sector: Funding sector:	Total	Federal	Industry		Industry FFRDCS		Universities & colleges		U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS				
	U.S.	Federal Govt.	Federal	Govt.	Federal	Govt. ^b	Federal Govt.	Nonfed. govt.	Industry	U&C	Non- profit	Federal Gov't	Total	Federal Gov't	Industry	Non- profit	Federal Govt.
<i>Calendar year^d</i>																	
1970	3,567	563	566	122	444	36	1,826	1,309	173	42	190	112	267	311	195	44	72
1971	3,698	582	557	101	456	33	1,941	1,367	193	48	211	123	256	329	207	45	77
1972	3,829	603	554	91	463	39	2,030	1,429	195	54	218	134	347	316	216	47	84
1973	4,051	652	595	96	499	36	2,078	1,471	196	58	217	135	320	371	232	49	90
1974	4,439	715	650	114	536	49	2,217	1,566	200	63	242	146	402	405	245	54	106
1975	4,827	760	677	104	573	53	2,445	1,732	212	72	265	165	457	435	255	60	120
1976	5,291	850	750	116	634	69	2,612	1,883	216	73	272	168	534	477	278	64	135
1977	5,925	943	836	135	701	75	2,883	2,061	227	84	320	192	667	521	301	70	150
1978	6,844	1,044	941	156	785	94	3,255	2,310	251	103	381	210	906	601	351	80	170
1979	7,736	1,112	1,054	161	893	104	3,723	2,648	282	121	450	223	1,050	693	413	85	195
1980	8,651	1,212	1,205	170	1,035	120	4,176	2,961	300	148	522	244	1,167	771	461	95	215
1981	9,741	1,343	1,477	164	1,313	137	4,665	3,296	329	177	602	262	1,284	835	505	105	225
1982	10,658	1,522	1,776	253	1,523	128	4,985	3,438	362	205	679	300	1,366	881	551	115	215
1983	11,859	1,733	2,106	346	1,760	117	5,411	3,618	388	248	803	354	1,536	958	613	125	220
1984	13,176	1,877	2,472	340	2,132	136	5,939	4,24	298	278	878	380	1,709	1,044	656	149	238
1985	14,510	1,947	2,731	358	2,373	131	6,790	4,474	487	366	1,032	432	1,793	1,118	681	172	264
1986	16,885	2,026	3,930	434	3,496	117	7,718	4,994	588	451	1,213	472	1,919	1,179	700	195	284
1987	18,213	2,047	4,181	598	3,583	142	8,518	5,451	650	505	1,380	532	2,086	1,238	707	210	321
1988	19,381	2,116	4,163	656	3,507	337	9,118	5,807	690	549	1,483	589	2,272	1,351	756	230	364
1989	21,477	2,309	4,818	986	3,832	398	10,003	6,307	750	618	1,667	661	2,371	1,532	860	258	414
1990	22,556	2,319	4,629	869	3,760	499	10,882	6,767	821	692	1,867	736	2,470	1,693	947	287	459
1991 ^e	26,629	2,378	7,376	1,251	6,125	461	11,831	7,273	904	749	2,089	816	2,657	1,850	1,036	313	501
1992	27,044	2,419	6,528	712	5,816	474	12,710	7,886	933	805	2,202	884	2,867	1,980	1,114	329	537
1993	28,125	2,623	6,427	466	5,961	492	13,497	8,537	957	843	2,235	925	2,953	2,062	1,155	339	567
1994	28,934	2,557	6,514	436	6,078	503	14,267	9,091	970	878	2,361	968	2,944	2,075	1,128	351	596
1995	28,642	2,638	5,569	190	5,379	530	14,945	9,547	1,017	923	2,477	982	2,781	2,104	1,116	382	606
1996 prelim.	29,574	2,477	6,056	182	5,874	530	15,500	9,837	1,059	984	2,597	1,023	2,781	2,155	1,114	412	630
1997 prelim.	31,212	2,687	6,645	178	6,467	530	16,101	10,142	1,113	1,046	2,725	1,075	2,781	2,385	1,279	445	661

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources*: 1998 (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

Industry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bFor 1953-63, basic research of industry FFRDCs were not separated out from total federal support to the industrial sector for basic research. Thus, the figure for federal support includes support for basic research at industry FFRDCs for those years. The same is true for basic research by nonprofit FFRDCs in 1953-87, which is included in federal support for those years.

^cIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^dExpenditure levels for Academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eDue to revisions in survey methodology and sampling of industrial R&D data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources*: 1997 Data Update, <<http://www.nsf.gov/sbe/srs/natpat7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources*: 1998 (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-2 and 4-7.

Appendix table 4-8.
U.S. basic research expenditures, by performing sector and source of funds: 1970-97
 (Millions of constant 1992 dollars)

Performing sector: Funding sector:	Total	Federal	Industry	Industry FFRDCS		Universities & colleges			U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS					
	U.S.	Govt.	Federal	Govt.	Industry ^a	Federal	Nonfed.	govt.	Industry	U&C	Non- profit	Federal	Gov't.	Total	Industry	Non- profit	Federal Govt.	
	Total	U.S.	Total	U.S.	Total	Federal	Govt.	Total	Govt.	Total	Federal	Govt.	Total	Federal	Gov't.	Total	Industry	Non- profit
<i>Calendar year^d</i>																		
1970	11,672	1,841	1,852	399	1,453	118	5,973	4,284	565	136	621	367	873	1016	636	144	236	
1971	11,503	1,809	1,733	314	1,419	103	6,039	4,252	601	149	655	382	796	1024	644	140	240	
1972	11,428	1,798	1,653	272	1,382	116	6,057	4,263	582	161	651	400	767	1036	645	140	251	
1973	11,451	1,843	1,682	271	1,411	102	5,874	4,159	555	163	615	382	903	1047	654	139	254	
1974	11,520	1,856	1,687	296	1,391	127	5,755	4,065	519	164	629	378	1044	1051	636	140	275	
1975	11,449	1,803	1,606	247	1,359	126	5,799	4,107	503	170	628	391	1085	1032	605	142	285	
1976	11,859	1,905	1,681	260	1,421	155	5,854	4,219	483	164	611	377	1197	1068	622	143	303	
1977	12,484	1,987	1,761	284	1,477	158	6,075	4,341	478	177	673	405	1405	1098	635	147	316	
1978	13,434	2,051	1,848	306	1,542	185	6,391	4,536	492	202	748	413	1779	1181	690	157	334	
1979	13,998	2,013	1,907	291	1,616	188	6,737	4,792	510	219	813	404	1899	1253	746	154	353	
1980	14,327	2,008	1,996	282	1,714	199	6,915	4,904	497	246	864	464	1932	1277	764	157	356	
1981	14,748	2,033	2,236	248	1,988	207	7,063	4,989	498	267	911	397	1944	1264	765	159	341	
1982	15,180	2,167	2,530	360	2,169	182	7,100	4,897	516	292	967	428	1946	1255	785	164	306	
1983	16,203	2,367	2,877	473	2,405	160	7,392	4,943	530	339	1097	483	2098	1308	837	171	301	
1984	17,349	2,471	3,255	448	2,807	179	7,819	5,212	558	393	1157	501	2250	1374	864	197	313	
1985	18,472	2,479	3,477	456	3,021	167	8,644	5,695	620	465	1313	550	2282	1423	867	220	337	
1986	20,952	2,514	4,877	539	4,338	145	9,577	6,197	730	560	1505	585	2377	1464	869	242	353	
1987	21,926	2,465	5,033	720	4,314	171	10,255	6,562	783	608	1661	641	2511	1490	851	252	387	
1988	22,508	2,458	4,835	762	4,073	391	10,590	6,744	801	637	1723	684	2638	1569	878	268	423	
1989	23,937	2,573	5,370	1,099	4,271	444	11,148	7,030	836	688	1857	737	2643	1708	959	288	461	
1990	24,088	2,476	4,943	928	4,015	533	11,621	7,226	877	739	1994	786	2638	1808	1011	307	490	
1991 ^e	27,362	2,444	7,579	1,285	6,294	474	12,156	7,473	929	770	2146	838	2730	1901	1064	322	515	
1992	27,044	2,419	6,528	712	5,816	474	12,710	7,886	933	805	2202	884	2867	1980	1114	329	537	
1993	27,408	2,556	6,263	454	5,809	479	13,152	8,319	932	822	2178	902	2878	2009	1126	330	553	
1994	27,567	2,436	6,206	415	5,791	479	13,593	8,661	924	836	2250	922	2805	1977	1075	335	568	
1995	26,628	2,453	5,177	5,001	493	13,894	8,875	945	858	2303	913	2585	1956	1038	355	564	69	
1996 prelim.	26,881	2,252	5,505	166	5,339	482	14,088	8,941	963	895	2360	929	2528	1959	1013	374	572	68
1997 prelim.	27,643	2,379	5,885	158	5,728	469	14,260	8,983	986	926	2413	952	2463	2112	1133	394	585	74

FFRDCs = federally funded research and development centers; U&C = universities and colleges.

NOTES: Data are based on annual reports by performers except for the nonprofit sector; R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next update of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

^aIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bIf 1953-63, basic research of industry FFRDCs were not separated out from total federal support to the industrial sector for basic research. Thus, the figure for federal support to industry for basic research at nonprofit FFRDCs in 1953-63, which is included in federal support for basic research at nonprofit FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^dDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

**Appendix table 4-9.
U.S. basic research expenditures, by source of funds and performer: 1970-97**
(Millions of current dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit FF RDCS				Industry U&Cs				Nonprofit			
	Total U.S.	Federal Govt.	Industry	FFRDCs	U&Cs	Non-profit	FFRDCS ^b	Total	Industry	U&Cs	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	
<i>Calendar year^d</i>																	
1970	3,567	2,491	563	122	36	1,309	267	195	NA ^e	444	42	44	190	184	72	112	173
1971	3,698	2,545	582	101	33	1,367	256	207	NA ^e	456	48	45	211	200	77	123	193
1972	3,829	2,634	603	91	39	1,429	257	216	NA ^e	463	54	47	218	218	84	134	195
1973	4,051	2,806	652	96	36	1,471	320	232	NA ^e	606	499	49	217	225	90	135	196
1974	4,439	3,091	715	114	49	1,566	402	245	NA ^e	653	536	54	242	252	106	146	200
1975	4,827	3,361	760	104	53	1,732	457	255	NA ^e	705	573	72	60	265	120	165	212
1976	5,291	3,729	850	116	69	1,883	534	278	NA ^e	771	634	73	64	272	135	168	216
1977	5,925	4,181	943	135	75	2,061	667	301	NA ^e	855	701	84	70	320	150	192	227
1978	6,841	4,861	1,044	156	94	2,310	906	351	NA ^e	968	785	103	80	381	170	210	251
1979	7,736	5,487	1,112	161	104	2,648	1,050	413	NA ^e	1,099	893	121	85	450	418	195	223
1980	8,651	6,091	1,212	170	120	2,961	1,167	461	NA ^e	1,278	1,035	148	95	522	459	215	282
1981	9,741	6,728	1,343	164	137	3,296	1,284	505	NA ^e	1,595	1,313	177	105	602	487	225	300
1982	10,658	7,258	1,522	253	128	3,438	1,366	551	NA ^e	1,843	1,523	205	115	679	515	215	329
1983	11,859	7,961	1,733	346	117	3,618	1,536	613	NA ^e	2,133	1,760	248	125	803	574	220	362
1984	13,176	8,676	1,877	340	136	3,958	1,709	656	NA ^e	2,579	2,132	298	149	878	618	238	388
1985	14,510	9,384	1,947	358	131	4,474	1,793	681	NA ^e	2,911	2,373	366	172	1,032	696	264	424
1986	16,885	10,186	2,026	434	117	4,994	1,915	700	NA ^e	4,142	3,496	451	195	1,213	756	284	432
1987	18,213	11,031	2,047	598	142	5,451	2,086	707	NA ^e	4,297	3,583	505	210	1,380	854	321	532
1988	19,381	11,968	2,116	656	337	5,807	2,272	756	NA ^e	4,286	3,507	549	230	1,483	953	364	650
1989	21,477	13,278	2,309	986	398	6,307	2,371	860	NA ^e	4,708	3,832	618	258	1,667	1,075	414	690
1990	22,556	13,935	2,319	869	499	6,767	2,470	947	NA ^e	4,739	3,760	692	287	1,867	1,194	459	750
1991	26,629	15,133	2,378	1,251	461	7,273	2,657	1,036	NA ^e	77	7,187	6,125	749	313	2,089	537	904
1992	27,044	15,538	2,419	712	474	7,886	2,867	1,114	NA ^e	67	6,950	5,816	805	329	2,202	1,421	933
1993	28,125	16,297	2,623	466	492	8,537	2,953	1,155	NA ^e	72	7,143	5,961	843	339	2,235	1,493	925
1994	28,934	16,732	2,557	436	503	9,091	2,944	1,128	NA ^e	74	7,307	6,078	878	351	2,361	1,563	977
1995	28,642	16,876	2,638	190	530	9,547	2,781	1,116	NA ^e	74	6,684	5,379	923	382	2,477	1,588	968
1996 prelim.	29,574	16,996	2,477	182	530	9,837	2,781	1,114	NA ^e	74	7,270	5,874	984	412	2,597	1,652	970
1997 prelim.	31,212	17,680	2,687	178	530	10,142	2,781	1,279	NA ^e	83	7,957	6,467	1,046	445	2,725	1,736	661
																	1,113

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, *Science Resources Studies Division (NSF/SRS), National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for Academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eFor 1953-63, basic research of industry FFRDCs were not separated out from total federal support to the industrial sector for basic research. Thus, the figure for federal support to basic research at nonprofit institutions for those years.

^fDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srsatpath7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-7 and 4-8.

Appendix table 4-10.
U.S. basic research expenditures, by source of funds and performer: 1970-97
 (Millions of constant 1992 dollars)

Funding sector: Performing sector:	Total U.S.	Total U.S.	Federal Government				Nonprofit FF RDcs				Industry U&Cs				Nonprofit U&Cs				Nonprofit U&Cs			
	Total U.S.	Federal Govt.	Industry	FF RDcs	U&Cs	FF RDcs ^b	Non-profit	FF RDcs	Total	Industry ^c	U&Cs	Non-profit	U&Cs	Total	Non-profit	U&Cs	Non-profit	U&Cs	Non-profit	U&Cs		
<i>Calendar year^d</i>																						
1970	11,672	8,151	1,841	399	118	4,284	873	636	NA ^e	1,733	1,453	136	144	621	603	236	367	565				
1971	11,503	7,919	1,809	314	103	4,252	796	644	NA ^e	1,707	1,419	149	140	655	621	240	382	601				
1972	11,428	7,861	1,798	272	116	4,263	767	645	NA ^e	1,683	1,382	161	140	651	651	251	400	582				
1973	11,451	7,933	1,843	271	102	4,159	903	654	NA ^e	1,712	1,411	163	139	615	637	254	382	555				
1974	11,520	8,024	1,856	296	127	4,065	1,044	636	NA ^e	1,695	1,391	164	140	629	653	275	378	519				
1975	11,449	7,971	1,803	247	126	4,107	1,085	605	NA ^e	1,672	1,359	170	142	628	676	285	391	503				
1976	11,859	8,358	1,905	260	155	4,219	1,197	622	NA ^e	1,728	1,421	164	143	611	680	303	377	483				
1977	12,484	8,810	1,987	284	158	4,341	1,405	635	NA ^e	1,801	1,477	177	147	673	721	316	405	478				
1978	13,434	9,546	2,051	306	185	4,536	1,779	690	NA ^e	1,900	1,542	202	157	748	747	334	413	492				
1979	13,998	9,930	2,013	291	188	4,792	1,899	746	NA ^e	1,988	1,616	219	154	813	756	353	404	510				
1980	14,327	10,087	2,008	282	199	4,904	1,932	764	NA ^e	2,117	1,714	246	157	864	761	356	405	497				
1981	14,748	10,187	2,033	248	207	4,989	1,944	765	NA ^e	2,414	1,988	267	159	911	738	341	397	498				
1982	15,180	10,338	2,167	360	182	4,897	1,946	785	NA ^e	2,625	2,169	292	164	967	734	306	428	516				
1983	16,203	10,878	2,367	473	160	4,943	2,098	837	NA ^e	2,914	2,405	339	171	1,097	784	301	483	530				
1984	17,349	11,424	2,471	448	179	5,212	2,250	864	NA ^e	3,396	2,807	393	197	1,157	814	313	501	558				
1985	18,472	11,946	2,479	456	167	5,695	2,282	867	NA ^e	3,706	3,021	465	220	1,313	886	337	550	620				
1986	20,952	12,639	2,514	539	145	6,197	2,377	869	NA ^e	5,140	4,338	560	242	1,505	938	353	585	730				
1987	21,926	13,280	2,465	720	171	6,562	2,511	851	NA ^e	5,174	4,314	608	252	1,661	1,028	387	641	783				
1988	22,508	13,899	2,458	762	391	6,744	2,638	878	28	4,978	4,073	637	268	1,723	1,107	423	684	801				
1989	22,508	13,899	2,458	762	391	6,744	2,638	878	28	4,978	4,073	637	268	1,723	1,107	423	684	801				
1990	23,937	14,798	2,573	1,099	444	7,030	2,643	959	52	5,247	4,271	688	288	1,857	1,198	461	737	836				
1991	24,088	14,881	2,476	928	533	7,226	2,638	1,011	69	5,061	4,015	739	307	1,994	1,275	490	786	877				
1992	27,362	15,549	2,444	1,285	474	7,473	2,730	1,064	79	7,385	6,294	770	322	2,146	1,353	515	838	929				
1993	27,044	15,538	2,419	712	474	7,886	2,867	1,114	67	6,950	5,816	805	329	2,202	1,421	537	884	933				
1994	27,408	15,882	2,556	454	479	8,319	2,878	1,126	70	6,961	5,809	822	330	2,178	1,455	553	902	932				
1995	27,567	15,942	2,436	415	479	8,661	2,805	1,075	71	6,962	5,791	836	335	2,250	1,490	568	922	924				
1996 prelim.	26,628	15,689	2,453	177	493	8,875	2,585	1,038	69	6,214	5,001	858	355	2,303	1,477	564	913	945				
1997 prelim.	26,881	15,448	2,252	166	482	8,941	2,528	1,013	68	6,608	5,339	895	374	2,360	1,502	572	929	963				
	27,643	15,659	2,379	158	469	8,983	2,463	1,133	74	7,048	5,728	926	394	2,413	1,538	585	952	986				

FFRDcs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDcs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of FFRDcs include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting to the industrial sector for basic research. Thus, these levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eFor 1953-63, basic research of industry FFRDcs were not separated out from total federal support to the industrial sector for basic research. Thus, the figure for federal support to industry R&D includes support for basic research at industry FFRDcs in 1953-87, which is included in federal support for basic research at nonprofit institutions for those years.

^fDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figure 4-7.

Appendix table 4-11.
U.S. applied research expenditures, by performing sector and source of funds: 1970-97
 (Millions of current dollars)

Performing sector: Funding sector:	Total	U.S.	Federal	Industry		Industry FFRDCS		Universities & colleges		U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS			
	Total	U.S.	Federal	Total	Federal	Govt. ^a	Federal	Govt. ^b	Total	Federal	Govt.	Federal	Govt. ^c	Total	Federal	Govt.	
<i>Calendar year^d</i>																	
1970	5,742	1,334	3,330	952	2,378	97	439	273	49	17	54	46	215	328	225	33	70
1971	5,817	1,355	3,348	907	2,441	67	487	299	58	19	63	48	213	349	241	34	74
1972	6,098	1,434	3,407	845	2,562	107	571	355	70	19	78	49	223	357	243	35	79
1973	6,662	1,527	3,715	883	2,832	110	719	455	85	25	95	59	215	376	257	36	83
1974	7,312	1,652	4,168	905	3,263	120	765	457	94	30	114	69	184	423	290	40	93
1975	8,048	1,912	4,431	991	3,440	139	892	532	107	36	133	85	211	463	315	43	105
1976	8,964	2,068	4,945	1,033	3,912	167	1,029	590	127	44	161	108	249	506	338	48	120
1977	9,653	2,081	5,424	1,113	4,311	212	1,096	616	131	49	185	116	297	543	355	53	135
1978	10,695	2,242	6,065	1,195	4,870	235	1,215	660	146	58	222	129	324	614	409	55	150
1979	12,073	2,415	6,975	1,305	5,670	250	1,363	750	161	68	257	127	360	710	480	60	170
1980	13,724	2,546	8,175	1,625	6,550	275	1,574	895	168	83	292	137	421	734	489	65	180
1981	16,389	2,731	10,401	2,042	8,359	298	1,750	950	192	103	352	153	422	786	521	75	190
1982	18,261	2,802	11,956	2,593	9,363	367	1,879	983	210	119	393	174	433	825	550	85	190
1983	20,323	2,991	13,513	3,227	10,286	414	2,051	1,088	208	133	431	190	473	880	585	95	200
1984	22,481	2,961	15,218	3,677	11,541	547	2,288	1,208	231	162	479	207	549	918	594	110	214
1985	25,389	3,135	17,625	4,717	12,908	630	2,473	1,280	251	188	532	223	579	947	581	127	238
1986	32,204	3,204	19,131	4,049	15,082	629	2,707	1,362	290	223	599	233	553	1,000	600	144	256
1987	37,819	3,366	19,190	4,037	15,153	623	3,072	1,549	323	251	685	264	532	1,037	593	155	289
1988	39,466	3,362	20,377	3,846	16,531	371	3,647	1,894	365	290	785	312	547	1,097	599	170	328
1989	32,304	3,566	22,317	3,324	17,993	374	4,116	2,102	409	337	908	360	602	1,258	695	191	372
1990	34,981	3,652	24,399	5,967	18,432	386	4,369	2,147	443	374	1,008	397	689	1,405	780	212	413
1991 ^e	38,699	4,094	27,013	5,588	21,425	433	4,544	2,176	470	389	1,085	424	927	1,603	921	231	451
1992	37,995	4,337	25,660	4,476	21,184	507	4,810	2,375	471	406	1,111	446	940	1,660	933	243	483
1993	37,318	4,838	24,251	4,295	19,956	435	5,068	2,500	495	437	1,157	479	962	1,661	900	251	103
1994	36,615	5,006	22,988	3,616	19,372	503	5,272	2,565	507	459	1,235	506	981	1,753	957	260	536
1995	40,927	5,054	26,919	3,164	23,755	535	5,532	2,687	536	486	1,305	517	979	1,779	951	282	546
1996 prelim.	43,353	5,000	29,065	3,125	25,940	535	5,779	2,814	555	515	1,360	535	979	1,883	1,012	304	567
1997 prelim.	46,208	5,083	31,663	3,102	28,560	535	5,975	2,869	580	545	1,420	560	979	1,863	940	329	595

FFRDCS = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

Industry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^aFor 1953-63, applied research of industry FFRDCs were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support to industry for applied research includes support for applied research at industry FFRDCs in 1953-87, which is included in federal support for applied research at nonprofit institutions for those years. The same is true for applied research at academic FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^dDue to revisions in survey methodology and sampling of industrial R&D data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srsatpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA, biennial series).

See figures 4-2 and 4-7.

Appendix table 4-12.
U.S. applied research expenditures, by performing sector and source of funds: 1970-97
 (Millions of constant 1992 dollars)

Performing sector: Funding sector:	Total	Federal	Industry	Industry FFRDCS		Universities & colleges			U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS					
	U.S.	Federal Govt.	Federal Govt.	Federal	Industry ^a	Federal Govt. ^b	Federal govt.	Nonfed. govt.	Industry	U&C	Non- profit	Federal govt.	Total	Federal govt.	Industry	Non- profit	Federal govt.	
<i>Calendar year^d</i>																		
1970	18,787	4,363	10,896	3,115	7,781	317	1,436	894	161	55	177	150	702	1,073	736	108	229	
1971	18,787	4,363	10,896	3,115	7,781	317	1,436	894	161	55	177	150	702	1,073	736	108	229	
1972	18,098	4,214	10,416	2,822	7,594	208	1,514	930	180	58	197	148	662	1,084	748	106	230	
1973	18,197	4,278	10,167	2,522	7,646	319	1,705	1,060	209	57	233	145	664	1,064	724	104	236	
1974	18,831	4,316	10,501	2,496	8,005	311	2,032	1,287	241	69	267	167	607	1,063	726	102	235	
1975	18,979	4,288	10,818	2,349	8,469	311	1,985	1,187	245	79	296	178	478	1,098	753	104	241	
1976	19,089	4,534	10,510	2,351	8,159	330	2,117	1,262	253	86	315	200	500	1,098	747	102	249	
1977	20,091	4,636	11,083	2,315	8,768	374	2,307	1,322	285	98	360	242	558	1,133	756	108	269	
1978	20,339	4,384	11,428	2,345	9,083	447	2,310	1,298	276	102	389	244	626	1,144	748	112	284	
1979	21,002	4,402	11,910	2,347	9,563	461	2,387	1,296	287	114	436	253	636	1,205	803	108	295	
1980	21,847	4,370	12,621	2,361	10,260	452	2,467	1,357	292	123	465	230	651	1,285	869	109	308	
1981	22,730	4,217	13,539	2,691	10,848	455	2,607	1,482	278	138	483	226	697	1,215	809	108	298	
1982	24,812	4,135	15,747	3,092	12,655	451	2,649	1,438	291	156	532	232	639	1,190	789	114	288	
1983	26,010	3,990	17,029	3,693	13,336	523	2,676	1,400	300	169	560	248	616	1,175	783	121	271	
1984	27,767	4,087	18,463	4,409	14,054	566	2,803	1,487	285	182	589	259	647	1,202	799	130	273	
1985	29,601	3,899	20,037	4,841	15,196	720	3,013	1,591	304	214	631	273	722	1,209	782	145	282	
1986	32,320	3,991	22,437	6,005	16,432	802	3,148	1,629	319	240	677	283	738	1,205	740	162	303	
1987	33,782	3,976	23,739	5,024	18,714	780	3,359	1,690	360	276	743	289	687	1,241	745	179	317	
1988	33,491	4,052	23,103	4,860	18,243	750	3,698	1,864	389	302	825	318	640	1,248	714	186	348	
1989	34,222	3,905	23,666	4,467	19,199	431	4,236	2,200	424	337	912	362	635	1,274	695	198	381	
1990	36,004	3,975	24,873	4,819	20,054	417	4,587	2,343	455	375	1,012	402	671	1,402	774	213	415	
1991 ^e	37,357	3,900	26,056	6,372	19,684	412	4,666	2,293	473	399	1,076	424	736	1,500	832	227	441	
1992	39,765	4,206	27,757	5,742	22,015	445	4,669	2,236	483	400	1,115	435	952	1,647	946	238	463	
1993	37,995	4,337	25,660	4,476	21,184	507	4,810	2,375	471	406	1,111	446	940	1,660	933	243	483	
1994	36,367	4,715	23,633	4,186	19,447	424	4,939	2,436	483	425	1,128	467	938	1,619	877	244	498	
1995	34,886	4,770	21,902	3,445	18,457	479	5,023	2,444	483	437	1,177	482	935	1,670	912	247	511	
1996 prelim. ...	38,049	4,698	25,026	2,941	22,084	497	5,143	2,498	494	452	1,214	481	911	1,654	884	262	507	120
1997 prelim. ...	40,924	4,502	28,042	2,748	25,295	474	5,291	2,541	514	483	1,236	487	890	1,711	919	276	515	101

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1983-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, *Science Resources Studies*.

^aIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bFor 1953-63, applied research of industry FFRDCs were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support to applied research by nonprofit FFRDCs in 1953-87, which is included in federal support for applied research at nonprofit institutions, for those years.

^cIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eData Update, <<http://www.nsf.gov/sbe/srs/natpat7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat7/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

See figure 4-7.

Appendix table 4-13.
U.S. applied research expenditures, by source of funds and performer: 1970-97
 (Millions of current dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit FF RDCS ^b				Industry U&Cs				Nonprofit U&Cs				Nonprofit U&Cs			
	Total U.S.	Federal Govt.	Industry	FFRDCS	U&Cs	FFRDCS	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	U&Cs	Total	Non-profit	U&Cs	Total	Non-profit	U&Cs	Total	
<i>Calendar year^d</i>																					
1970	5,742	3,095	1,334	952	97	273	215	225	NA ^e	2,428	2,378	17	33	54	116	70	46	49			
1971	5,817	3,081	1,355	907	67	299	213	241	NA ^e	2,494	2,441	19	34	63	122	74	48	58			
1972	6,098	3,206	1,434	845	107	355	223	243	NA ^e	2,616	2,562	19	35	78	128	79	49	70			
6,662	3,447	1,527	883	110	455	215	257	NA ^e	2,893	2,832	25	36	95	142	83	59	85				
7,312	3,609	1,652	905	120	457	184	290	NA ^e	3,333	3,263	30	40	114	162	93	69	94				
8,048	4,100	1,912	991	139	532	211	315	NA ^e	3,519	3,440	36	43	133	190	105	85	107				
1976	8,964	4,444	2,068	1,033	167	590	249	338	NA ^e	4,004	3,912	44	48	161	228	120	108	127			
9,653	4,674	2,081	1,113	212	616	297	355	NA ^e	4,413	4,311	49	53	185	251	135	116	131				
10,695	5,064	2,242	1,195	235	660	324	409	NA ^e	4,983	4,870	58	55	222	279	150	129	146				
12,073	5,560	2,415	1,305	250	750	360	480	NA ^e	5,798	5,670	68	60	257	297	170	127	161				
13,724	6,251	2,546	1,625	275	895	421	489	NA ^e	6,698	6,550	83	65	292	317	180	137	168				
16,389	6,964	2,731	2,042	298	950	422	521	NA ^e	8,537	8,359	103	75	352	343	190	153	192				
18,261	7,727	2,802	2,593	367	983	433	550	NA ^e	9,567	9,363	119	85	393	364	190	174	210				
19,83	8,779	2,991	3,227	414	1,088	473	585	NA ^e	10,514	10,286	133	95	431	390	200	190	208				
22,481	9,536	2,961	3,677	547	1,208	549	594	NA ^e	11,814	11,541	162	110	479	422	214	207	231				
25,389	10,922	3,135	4,717	630	1,280	579	581	NA ^e	13,224	12,908	188	127	532	461	238	223	251				
27,225	10,398	3,204	4,049	629	1,362	553	600	NA ^e	15,449	15,082	223	144	599	489	256	233	290				
27,819	10,699	3,366	4,037	623	1,549	532	593	NA ^e	15,559	15,153	251	155	685	554	289	264	323				
29,466	10,684	3,362	3,846	371	1,894	547	599	66	16,992	16,531	290	170	785	640	328	312	365				
29,466	10,684	3,362	3,846	371	1,894	547	599	66	16,992	16,531	290	170	785	640	328	312	365				
32,304	11,733	3,566	4,324	374	2,102	602	695	70	18,521	17,993	337	191	908	733	372	360	409				
34,981	13,702	3,652	5,967	386	2,147	689	780	81	19,018	18,432	374	212	1,008	810	413	397	443				
38,699	14,224	4,094	5,588	433	2,176	927	921	86	22,045	21,425	389	231	1,085	875	451	424	470				
37,995	13,650	4,337	4,476	507	2,375	940	933	81	21,834	21,184	406	243	1,111	929	483	446	471				
37,318	14,033	4,838	4,295	435	2,500	962	900	103	20,643	19,956	437	251	1,157	990	511	479	495				
36,615	13,741	5,006	3,616	503	2,565	981	957	112	20,091	19,372	459	260	1,235	1,042	536	506	507				
40,927	13,499	5,054	3,164	535	2,687	979	951	129	24,524	23,755	486	282	1,305	1,063	546	517	536				
43,353	13,576	5,000	3,125	535	2,814	979	1,012	111	26,760	25,940	515	304	1,360	1,102	567	535	555				
46,208	13,618	5,083	3,102	535	2,869	979	940	110	29,434	28,560	545	329	1,420	1,155	595	560	580				

FFRDCS = federally funded research and development centers; U&C = universities and colleges.

NOTES: Data are based on annual reports by performers except for the nonprofit sector, R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1983-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal governments support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCS administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of FFRDCS expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eFor 1953-63, applied research of industry FFRDCs were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support for applied research by nonprofit FFRDCs in 1953-87, which is included in federal support for applied research at nonprofit institutions for those years.

^fDue to revisions in survey methodology and sampling of industrial R&D data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series). See figures 4-7 and 4-8.

**Appendix table 4-14.
U.S. applied research expenditures, by source of funds and performer: 1970-97**
(Millions of constant 1992 dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit FF RDCS				Industry				Nonprofit			
	Total U.S.	Federal Govt.	Industry	FFRDCs	U&Cs	Non-profit	FFRDCS ^b	Total	Industry	U&Cs	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	
<i>Calendar year^d</i>																	
1970	18,787	10,128	4,363	3,115	317	894	702	736	NA ^e	7,944	7,781	55	108	177	379	229	
1971	18,098	9,585	4,214	2,822	208	930	662	748	NA ^e	7,758	7,594	58	106	197	378	230	
1972	18,197	9,567	4,278	2,522	319	1,060	664	724	NA ^e	7,808	7,646	57	104	233	381	236	
1973	18,831	9,744	4,316	2,496	311	1,287	607	726	NA ^e	8,176	8,005	69	102	267	402	235	
1974	18,979	9,366	4,288	2,349	311	1,187	478	753	NA ^e	8,652	8,469	79	104	296	420	241	
1975	19,089	9,724	4,534	2,351	330	1,262	500	747	NA ^e	8,347	8,159	86	102	315	449	249	
1976	20,091	9,961	4,636	2,315	374	1,322	558	756	NA ^e	8,974	8,768	98	108	360	511	269	
1977	20,339	9,848	4,384	2,345	447	1,298	626	748	NA ^e	9,297	9,083	102	112	389	528	284	
1978	21,002	9,945	4,402	2,347	461	1,296	636	803	NA ^e	9,786	9,563	114	108	436	547	295	
1979	21,847	10,061	4,370	2,361	452	1,357	651	869	NA ^e	10,492	10,260	123	109	465	537	308	
1980	22,730	10,352	4,217	2,691	455	1,482	697	809	NA ^e	11,093	10,848	138	108	483	524	298	
1981	24,812	10,544	4,135	3,092	451	1,438	639	789	NA ^e	12,925	12,655	156	114	532	520	288	
1982	26,010	11,006	3,990	3,693	523	1,400	616	783	NA ^e	13,626	13,336	169	121	560	518	271	
1983	27,767	11,994	4,087	4,409	566	1,487	647	799	NA ^e	14,366	14,054	182	130	589	533	273	
1984	29,601	12,555	3,899	4,841	720	1,591	722	782	NA ^e	15,555	15,196	214	145	631	555	282	
1985	32,320	13,904	3,991	6,005	802	1,629	738	740	NA ^e	16,834	16,432	240	162	677	586	303	
1986	33,782	12,902	3,976	5,024	780	1,690	687	745	NA ^e	19,170	18,714	276	179	743	607	317	
1987	33,491	12,880	4,052	4,860	750	1,864	640	714	NA ^e	18,731	18,243	302	186	825	666	348	
1988	34,222	12,409	3,905	4,467	431	2,200	635	695	NA ^e	19,734	19,193	337	198	912	743	381	
1989	36,004	13,077	3,975	4,819	417	2,343	671	774	NA ^e	20,642	20,054	375	213	1,012	817	402	
1990	37,357	14,633	3,900	6,372	412	2,293	736	832	NA ^e	20,310	19,684	399	227	865	441	424	
1991	39,765	14,616	4,206	5,742	445	2,236	952	946	NA ^e	22,652	22,015	400	238	1,115	899	435	
1992	37,995	13,650	4,337	4,476	507	2,375	940	933	NA ^e	21,834	21,184	406	243	1,111	929	471	
1993	36,367	13,675	4,715	4,186	424	2,436	938	877	NA ^e	20,117	19,447	425	244	1,128	965	467	
1994	34,886	13,091	4,770	3,445	479	2,444	935	912	NA ^e	19,142	18,457	437	247	1,177	993	511	
1995	38,049	12,550	4,698	2,941	497	2,498	911	884	NA ^e	120	22,799	22,084	452	262	1,214	988	507
1996 prelim.	39,404	12,339	4,545	2,840	486	2,557	890	919	NA ^e	101	24,323	23,578	469	276	1,236	1,002	515
1997 prelim.	40,924	12,061	4,502	2,748	474	2,541	867	832	NA ^e	97	26,069	25,295	483	291	1,258	1,023	527

FFRDCS = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCS administered by academic institutions. In 1994-99 percent of total funds used were from federal sources.

^cIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eFor 1953-63, applied research of industry FFRDCS were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support to industry R&D is included in federal support for applied research at nonprofit institutions for those years.

^fDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srsatpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA, biennial series).

See figure 4-7.

Appendix table 4-15.
U.S. development expenditures, by performing sector and source of funds: 1970-97
 (Millions of current dollars)

Performing sector: Funding sector:	Total	Federal	Industry	Industry FFRDCS		Universities & colleges			U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS	
	U.S.	Federal Govt.	Federal Govt.	Federal	Industry ^a	Federal Govt.	Nonfed. govt.	Industry	U&C	Non- profit	Federal Gov't	Industry	Non- profit	Federal Govt.
<i>Calendar year^d</i>														
1970	16,926	2,258	13,698	6,232	7,466	340	112	84	6	5	7	10	251	268
1971	17,395	2,473	13,924	6,167	7,757	391	105	76	7	5	8	9	257	246
1972	18,734	2,640	15,043	6,533	8,510	402	93	59	11	3	12	8	290	213
1973	20,193	2,658	16,394	6,621	9,773	399	122	70	17	5	19	12	295	268
1974	21,488	2,766	17,421	6,553	10,868	479	137	73	20	6	24	15	309	326
1975	22,691	2,890	18,352	6,783	11,569	535	152	80	21	8	27	16	359	377
1976	25,059	2,972	20,412	7,522	12,890	654	173	93	24	10	30	16	424	425
1977	27,655	3,188	22,603	8,275	14,328	675	227	133	26	14	37	17	503	459
1978	31,047	3,676	25,216	7,756	16,460	753	340	224	32	15	48	22	542	520
1979	35,460	3,944	29,033	9,888	19,145	810	454	325	34	15	53	27	603	403
1980	40,701	4,072	33,848	10,957	22,891	882	510	361	37	18	64	30	719	330
1981	46,060	4,530	38,547	12,791	25,756	950	551	375	42	23	77	34	778	230
1982	51,714	5,178	43,434	14,215	29,219	989	599	402	46	26	86	38	745	277
1983	57,560	6,106	48,064	15,522	32,542	1,054	605	393	46	29	95	42	832	303
1984	66,284	7,078	55,371	17,640	37,731	1,056	660	423	51	36	105	46	987	359
1985	74,444	8,011	62,020	20,258	41,762	1,102	734	472	55	41	117	49	1,133	220
1986	75,796	8,275	62,871	21,517	41,354	1,145	809	513	64	49	132	51	1,244	234
1987	79,809	8,176	66,789	24,122	42,667	1,230	890	556	71	55	150	58	900	259
1988	84,614	8,864	70,353	23,719	46,634	1,414	1,076	691	80	64	172	68	726	207
1989	87,767	9,355	72,725	21,049	51,676	1,423	1,185	742	90	74	199	79	868	193
1990	94,118	9,700	78,376	18,966	59,410	1,438	1,359	871	97	82	221	87	1,334	159
1991 ^e	95,193	8,778	80,286	17,256	63,030	1,383	1,518	998	103	85	238	93	1,503	110
1992	99,184	9,098	84,569	17,181	67,388	1,373	1,580	1,045	103	89	244	98	1,452	95
1993	99,746	9,071	84,701	84,757	16,083	68,674	1,039	1,656	1,092	109	96	254	1,374	130
1994	103,005	8,877	87,890	16,209	71,681	1,196	1,765	1,171	111	101	271	111	1,380	143
1995	113,445	9,539	97,342	17,824	79,518	1,209	1,826	1,201	118	107	287	114	1,645	143
1996 prelim.	120,281	9,297	104,457	17,624	86,834	1,209	1,855	1,204	122	113	298	118	1,645	143
1997 prelim.	128,323	8,681	113,111	17,507	95,604	1,209	1,956	1,274	127	120	312	123	1,645	143

FFRDCS = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

Industry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bFor 1953-63, development expenditures by industry FFRDCs were not separated out from total federal support to the industrial sector for development. Thus, the figure for federal support to industry for development at nonprofit institutions for those years includes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

^dDue to revisions in survey methodology and sampling of industry R&D data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figures 4-2 and 4-7.

Appendix table 4-16.
U.S. development expenditures, by performing sector and source of funds: 1970-97
 (Millions of constant 1992 dollars)

Performing sector: Funding sector:	Total	Federal	Industry	Industry FFRDCS		Universities & colleges			U&C FFRDCS		Other nonprofit institutions		Nonprofit FFRDCS			
	U.S.	Federal Govt.	Industry Federal Govt.	Federal	Industry	Federal Govt.	Nonfed. Govt.	Industry	U&C	Non- profit	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total
U.S.	Total	Federal Govt.	Total	Federal	Industry	Total	Federal Govt.	Industry	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.
<i>Calendar year^d</i>																
1970	55,383	7,387	44,820	20,391	24,429	1,112	366	274	21	16	23	820	877	720	59	98
1971	54,118	7,692	43,319	19,186	24,133	1,216	327	236	23	14	25	798	765	604	59	103
1972	55,906	7,877	44,892	19,496	25,396	1,200	276	175	32	10	35	864	797	636	57	104
1973	57,080	7,512	46,342	18,716	27,626	1,128	344	199	47	13	52	33	833	920	756	57
1974	55,773	7,178	45,218	17,009	28,209	1,243	355	189	51	16	61	38	802	977	814	55
1975	53,820	6,854	43,529	16,089	27,441	1,269	361	190	51	18	64	38	851	956	783	52
1976	56,166	6,661	45,749	16,859	28,890	1,466	388	209	53	23	67	36	949	953	764	52
1977	58,268	6,717	47,623	17,435	30,188	1,422	478	279	55	30	78	36	1,060	967	756	57
1978	60,968	7,219	49,518	17,195	32,323	1,479	668	440	62	29	94	44	1,064	1,020	790	59
1979	64,165	7,136	52,535	17,892	34,643	1,466	821	588	61	27	97	48	1,092	1,116	873	63
1980	67,408	6,745	56,058	18,147	37,912	1,461	844	597	61	30	106	50	1,190	1,110	869	66
1981	69,734	6,859	58,359	19,365	38,994	1,438	834	568	64	34	117	51	1,178	1,065	831	68
1982	73,657	7,375	61,864	20,247	41,617	1,409	853	573	66	37	123	54	1,061	1,095	853	71
1983	78,644	8,342	65,669	21,208	44,462	1,440	826	538	62	40	129	57	1,136	1,230	977	75
1984	87,276	9,320	72,906	23,226	49,680	1,390	869	557	67	47	138	60	1,299	1,492	1,218	86
1985	94,767	10,197	78,951	25,788	53,163	1,403	935	601	70	53	149	62	1,583	1,698	1,400	95
1986	94,051	10,268	78,013	26,699	51,314	1,421	1,004	637	79	61	163	63	1,865	1,480	1,163	105
1987	96,081	9,842	80,407	29,040	51,366	1,481	1,072	669	85	66	181	70	2,010	1,270	928	110
1988	98,270	10,295	81,707	27,547	54,160	1,642	1,249	802	93	74	200	79	2,046	843	473	116
1989	97,819	10,427	81,054	23,460	57,594	1,586	1,320	827	100	82	222	88	1,985	967	565	125
1990	100,512	10,359	83,700	20,254	63,446	1,536	1,451	931	104	88	236	93	1,853	1,088	661	133
1991 ^e	97,814	9,019	82,496	17,731	64,765	1,421	1,560	1,025	106	88	245	96	1,579	1,191	742	140
1992	99,894	9,098	84,569	17,181	67,388	1,373	1,580	1,045	103	89	244	98	1,452	1,223	758	143
1993	97,203	8,840	82,596	15,673	69,923	1,013	1,614	1,064	106	93	248	102	1,339	1,242	767	144
1994	98,139	8,458	83,738	15,443	68,295	1,140	1,681	1,115	106	96	258	106	1,315	1,261	775	146
1995	105,466	8,868	90,496	16,570	73,926	1,124	1,697	1,117	109	99	266	106	1,529	1,194	701	154
1996 prelim.	109,326	8,450	94,944	16,018	78,925	1,099	1,686	1,094	111	103	271	107	1,495	1,183	677	163
1997 prelim.	113,651	7,688	100,178	15,505	84,673	1,071	1,732	1,128	113	106	276	109	1,457	1,126	604	171

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming). Data are preliminary for 1996 and 1997.

Industry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^bFor 1953-63, development expenditures by industry FFRDCs were not separated out from total federal support to the industrial sector for development by nonprofit FFRDCs in 1953-87, which is included in federal support for development at nonprofit institutions for those years.

^cIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eDue to revisions in survey methodology and sampling of industrial R&D data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

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Appendix table 4-17.
U.S. development expenditures, by source of funds and performer: 1970-97
 (Millions of current dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government				Nonprofit FF RDCS				Industry U&Cs				Nonprofit U&Cs				Nonprofit U&Cs			
	Total U.S.	Federal Govt.	Industry	FFRDCS	U&Cs	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit	FFRDCS	Total	Industry	U&Cs	Non-profit
<i>Calendar year^d</i>																					
1970	16,926	9,384	2,258	6,232	340	84	251	220	NA ^e	7,489	7,466	5	18	7	40	30	10	6			
1971	17,395	9,557	2,473	6,167	391	76	257	194	NA ^e	7,781	7,757	5	19	8	42	33	9	7			
1972	18,734	10,136	2,640	6,533	402	59	290	213	NA ^e	8,532	8,512	3	19	12	43	35	8	11			
1973	20,193	10,310	2,658	6,621	399	70	295	268	NA ^e	9,798	9,773	5	20	19	50	38	12	17			
1974	21,488	10,493	2,766	6,553	479	73	309	314	NA ^e	10,895	10,868	6	21	24	57	42	15	20			
1975	22,691	10,977	2,890	6,783	535	80	359	330	NA ^e	11,599	11,569	8	22	27	67	51	16	21			
1976	25,059	12,006	2,972	7,522	654	93	424	341	NA ^e	12,923	12,890	10	23	30	77	61	16	24			
1977	27,655	13,133	3,188	8,275	675	133	503	359	NA ^e	14,369	14,328	14	27	37	90	73	17	26			
1978	31,047	14,353	3,676	7,756	753	224	542	403	NA ^e	16,505	16,460	15	30	48	109	87	22	32			
1979	35,460	16,053	3,944	9,888	810	325	603	483	NA ^e	19,195	19,145	15	35	53	126	99	27	34			
1980	40,701	17,516	4,072	10,957	882	361	719	525	NA ^e	22,949	22,891	18	40	64	135	105	30	37			
1981	46,060	19,973	4,530	12,791	950	375	778	549	NA ^e	25,824	25,756	23	45	77	144	110	34	42			
1982	51,714	22,128	5,178	14,215	989	402	745	599	NA ^e	29,295	29,219	26	50	86	158	120	38	46			
1983	57,560	24,622	6,106	15,522	1,054	393	832	715	NA ^e	32,626	32,542	29	55	95	172	130	42	46			
1984	66,284	28,108	7,078	17,640	1,056	423	987	925	NA ^e	37,832	37,731	36	65	105	188	143	46	51			
1985	74,444	32,187	20,258	1,102	472	1,244	1,000	NA ^e	41,878	41,762	41	75	117	208	159	49	55				
1986	75,796	33,891	8,275	21,517	513	1,145	938	NA ^e	41,488	41,354	49	85	132	222	171	51	64				
1987	79,809	36,524	8,176	24,122	556	1,230	556	1,669	NA ^e	42,813	42,667	55	91	150	251	193	58	71			
1988	84,614	37,277	8,864	23,719	1,414	691	1,761	407	NA ^e	42,0	46,798	46,634	64	100	172	287	219	68	80		
1989	87,767	35,289	9,355	21,049	1,423	742	1,781	507	NA ^e	51,862	51,676	74	112	199	327	248	79	90			
1990	94,118	33,820	9,700	18,966	1,438	871	1,735	619	NA ^e	490	59,617	59,410	82	125	221	362	275	87	97		
1991	95,193	31,207	8,778	17,256	1,383	998	1,537	722	NA ^e	533	63,251	63,030	85	136	238	394	301	93	103		
1992	99,894	31,506	9,098	17,181	1,373	1,045	1,452	758	NA ^e	599	67,620	67,388	89	143	244	420	322	98	103		
1993	99,746	30,021	9,071	16,083	1,039	1,092	1,374	787	NA ^e	574	68,917	68,674	96	147	254	446	340	105	109		
1994	103,005	30,219	8,877	16,209	1,196	1,171	1,380	814	NA ^e	574	71,934	71,681	101	153	271	469	357	111	111		
1995	113,445	32,773	9,539	17,824	1,209	1,201	1,645	754	NA ^e	600	79,791	79,518	107	166	287	477	364	114	118		
1996	120,281	32,239	9,297	17,624	1,209	1,204	1,645	745	NA ^e	516	87,126	86,834	113	179	298	495	378	118	122		
1997	128,323	31,448	8,681	17,507	1,209	1,274	1,645	682	NA ^e	451	95,917	95,604	120	193	312	520	397	123	127		

FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98 along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on nonfederal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonprofit government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

^cIndustry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^dExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^eFor 1953-63, development expenditures by industry FFRDCs were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support for applied research at nonprofit institutions for those years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series). See figure 4-8.

Appendix table 4-18.
U.S. development expenditures, by source of funds and performer: 1970-97
 (Millions of constant 1992 dollars)

Funding sector: Performing sector:	Total U.S.	Federal Government			Nonprofit FF RDcs			Industry			Nonprofit			Nonprofit			
	Total U.S.	Federal Govt.	Industry	FFRDcs	U&Cs	FFRDcs ^b	Non-profit	FF RDcs	Total	Industry ^c	U&Cs	Non-profit	U&Cs	Total	U&Cs	Non-profit	
<i>Calendar year^d</i>																	
1970	55,383	30,704	7,387	20,391	1,112	274	820	720	NA ^e	24,504	24,429	16	59	23	98	33	21
1971	54,118	29,733	7,692	19,186	1,216	236	798	604	NA ^e	24,133	14	59	25	131	103	29	23
1972	55,906	30,248	7,877	19,496	1,200	175	864	636	NA ^e	25,463	10	57	35	128	104	24	32
1973	57,080	29,144	7,512	18,716	1,128	199	833	756	NA ^e	27,695	13	57	52	141	107	33	47
1974	55,773	27,235	7,178	17,009	1,243	189	802	814	NA ^e	28,280	16	55	61	147	109	38	51
1975	53,820	26,036	6,854	16,089	1,269	190	851	783	NA ^e	27,511	18	52	64	159	121	38	51
1976	56,166	26,908	6,661	16,859	1,466	209	949	764	NA ^e	28,965	23	52	67	173	137	36	53
1977	58,268	27,670	6,717	17,435	1,422	279	1,060	756	NA ^e	30,275	30	57	78	190	154	36	55
1978	60,968	28,186	7,219	17,195	1,479	440	1,064	790	NA ^e	32,411	29	59	94	215	171	44	62
1979	64,165	29,047	7,136	17,892	1,466	588	1,092	873	NA ^e	34,733	27	63	97	228	179	48	61
1980	67,408	29,009	6,745	18,147	1,461	597	1,190	869	NA ^e	38,008	30	66	106	224	174	50	61
1981	69,734	30,239	6,859	19,365	1,438	568	1,178	831	NA ^e	39,097	34	68	117	217	167	51	64
1982	73,657	31,517	7,375	20,247	1,409	573	1,061	853	NA ^e	41,726	37	71	123	225	171	54	66
1983	78,644	33,641	8,342	21,208	1,440	538	1,136	977	NA ^e	44,577	40	75	129	235	178	57	62
1984	87,276	37,010	9,320	23,226	1,390	557	1,299	1,218	NA ^e	49,680	47	86	138	248	188	60	67
1985	94,767	40,973	10,197	25,788	1,403	601	1,583	1,400	NA ^e	53,311	53	95	149	264	202	62	70
1986	94,051	42,054	10,268	26,699	1,421	637	1,865	1,163	NA ^e	51,480	61	105	163	275	212	63	79
1987	96,081	43,971	9,842	29,040	1,481	669	2,010	928	NA ^e	51,366	66	110	181	302	232	70	85
1988	98,270	43,293	10,295	27,547	1,642	802	2,046	973	NA ^e	51,542	74	116	200	333	254	79	93
1989	97,819	39,330	10,427	23,460	1,586	827	1,985	565	NA ^e	480	802	82	125	222	365	277	88
1990	100,512	36,117	10,359	20,254	1,536	931	1,853	661	NA ^e	523	63,667	88	133	236	387	294	93
1991	97,814	32,066	9,019	17,731	1,421	1,025	1,579	742	NA ^e	547	64,993	88	140	245	309	244	106
1992	99,894	31,506	9,098	17,181	1,373	1,045	1,452	758	NA ^e	59	67,620	89	143	242	322	222	103
1993	97,203	29,255	8,840	15,673	1,013	1,064	1,339	767	NA ^e	67,160	93	144	248	332	302	102	106
1994	98,139	28,792	8,458	15,443	1,140	1,115	1,315	775	NA ^e	68,536	96	146	258	446	341	106	109
1995	105,466	30,468	8,868	16,570	1,124	1,117	1,529	701	NA ^e	74,179	99	154	266	444	338	106	109
1996 prelim.	109,326	29,303	8,450	16,018	1,099	1,094	1,495	677	NA ^e	78,925	103	163	271	450	343	107	111
1997 prelim.	113,651	27,852	7,688	15,505	1,071	1,128	1,457	604	NA ^e	84,673	106	171	276	460	351	109	113

FFRDcs = federally funded research and development centers; U&Cs = universities and colleges

NOTES: Data are based on annual reports by performers except for the nonprofit sector. R&D expenditures by nonprofit sector performers have been estimated since 1973 on the basis of a survey conducted in that year. The next updates of these data, covering the years 1953-98, along with technical notes explaining methodological issues of measurement, will be provided in National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

^aBecause of limitations in the survey information, data on federal government funding to other performers are not available, and are consequently included in other sectors' support for their own R&D performance. For example, nonfederal government support to nonprofits is included in nonprofits' support for their own R&D (data column 16).

^bIncludes R&D expenditures of FFRDCs administered by academic institutions. In 1994, 99 percent of total funds used were from federal sources.

Industry sources of industry R&D expenditures include all nonfederal sources of industry R&D expenditures.

^cExpenditure levels for academic and Federal Government performers are also in reference to calendar years, which represents a change from previous reporting in *National Patterns of R&D Resources*. These levels are approximations based on fiscal year data. For 1977 and later years, the calendar year approximation is equal to 75 percent of the amount reported in the same fiscal year plus 25 percent of the amount reported in the subsequent fiscal year. For years prior to 1977, the respective percentages are 50 and 50, since earlier fiscal years began on July 1 instead of October 1.

^dFor 1953-63, development expenditures by industry FFRDCs were not separated out from total federal support to the industrial sector for applied research. Thus, the figure for federal support for applied research includes support for applied research at industry FFRDCs in 1953-87, which is included in federal support for applied research at nonprofit institutions for those years.

^eDue to revisions in survey methodology and sampling of industrial R&D, data for 1991 and subsequent years may not be comparable to data for previous years. See NSF/SRS, *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; or NSF/SRS, *National Patterns of R&D Resources: 1998* (Arlington, VA: forthcoming).

SOURCE: NSF/SRS, *National Patterns of R&D Resources* (Arlington, VA: biennial series).

See figure 4-7.

Appendix table 4-19.
Manufacturing and nonmanufacturing R&D expenditures: 1970–95

	All industries			All manufacturing industries			All nonmanufacturing industries		
	Total	Company	Federal	Total	Company	Federal	Total	Company	Federal
Millions of current dollars									
1970	18,067	10,288	7,779	17,362	10,063	7,299	705	225	480
1971	18,320	10,654	7,666	17,616	10,402	7,214	704	252	452
1972	19,552	11,535	8,017	18,845	11,258	7,587	707	277	430
1973	21,249	13,104	8,145	20,534	12,805	7,729	715	299	416
1974	22,887	14,667	8,220	22,119	14,362	7,757	768	305	463
1975	24,187	15,582	8,605	23,452	15,157	8,295	735	425	310
1976	26,997	17,436	9,561	26,152	16,965	9,187	845	471	374
1977	29,825	19,340	10,485	28,867	18,799	10,068	958	541	417
1978	33,304	22,115	11,189	32,075	21,413	10,662	1,229	702	527
1979	38,226	25,708	12,518	36,686	24,849	11,837	1,540	859	681
1980	44,505	30,476	14,029	42,690	29,439	13,251	1,815	1,037	778
1981	51,810	35,428	16,382	49,904	34,380	15,524	1,906	1,048	858
1982	58,650	40,105	18,545	56,178	38,633	17,545	2,472	1,472	1,000
1983	65,268	44,588	20,680	61,931	42,504	19,427	3,337	2,084	1,253
1984	74,800	51,404	23,396	69,895	48,152	21,743	4,905	3,252	1,653
1985	84,239	57,403	27,196	77,525	52,642	24,883	6,714	4,401	2,313
1986	87,823	59,932	27,891	80,377	55,192	25,185	7,446	4,740	2,706
1987	92,155	61,403	30,752	84,311	56,259	28,052	7,844	5,144	2,700
1988	97,015	66,672	30,343	86,503	59,415	27,088	10,513	7,257	3,256
1989	102,055	73,501	28,554	88,024	63,199	24,826	14,031	10,302	3,729
1990	109,727	81,602	28,125	88,934	65,251	23,683	20,793	16,351	4,442
1991	116,952	90,580	26,372	88,506	67,639	20,867	28,446	22,941	5,505
1992	119,110	94,388	24,722	90,177	71,025	19,152	28,933	23,363	5,570
1993	117,400	94,591	22,809	86,569	69,901	16,669	30,831	24,690	6,140
1994	119,595	97,131	22,463	90,749	73,375	17,373	28,846	23,756	5,090
1995	132,103	108,652	23,451	100,067	81,236	18,831	32,036	27,415	4,620
Millions of constant 1992 dollars^a									
1970	59,116	33,663	25,453	56,809	32,927	23,883	2,307	736	1,571
1971	56,995	33,146	23,850	54,805	32,362	22,443	2,190	784	1,406
1972	58,349	34,424	23,925	56,239	33,597	22,642	2,110	827	1,283
1973	60,066	37,042	23,024	58,045	36,197	21,848	2,021	845	1,176
1974	59,405	38,069	21,336	57,412	37,278	20,134	1,993	792	1,202
1975	57,370	36,959	20,410	55,626	35,951	19,675	1,743	1,008	735
1976	60,508	39,079	21,429	58,614	38,024	20,591	1,894	1,056	838
1977	62,840	40,748	22,091	60,821	39,609	21,213	2,018	1,140	879
1978	65,401	43,428	21,972	62,987	42,050	20,937	2,413	1,379	1,035
1979	69,170	46,519	22,651	66,383	44,964	21,419	2,787	1,554	1,232
1980	73,708	50,474	23,235	70,702	48,756	21,946	3,006	1,717	1,289
1981	78,439	53,637	24,802	75,554	52,051	23,503	2,886	1,587	1,299
1982	83,536	57,122	26,414	80,015	55,026	24,990	3,521	2,097	1,424
1983	89,175	60,920	28,255	84,616	58,073	26,543	4,559	2,847	1,712
1984	98,488	67,683	30,805	92,030	63,401	28,629	6,458	4,282	2,176
1985	107,236	73,074	34,620	98,689	67,013	31,676	8,547	5,602	2,944
1986	108,975	74,367	34,609	99,736	68,485	31,251	9,239	5,882	3,358
1987	110,945	73,923	37,022	101,501	67,730	33,772	9,443	6,193	3,251
1988	112,672	77,432	35,240	100,463	69,004	31,460	12,210	8,428	3,781
1989	113,743	81,919	31,824	98,105	70,437	27,669	15,638	11,482	4,156
1990	117,181	87,145	30,036	94,975	69,684	25,292	22,205	17,462	4,744
1991	120,171	93,073	27,098	90,942	69,501	21,441	29,229	23,573	5,657
1992	119,110	94,388	24,722	90,177	71,025	19,152	28,933	23,363	5,570
1993	114,407	92,180	22,228	84,362	68,119	16,244	30,045	24,061	5,983
1994	113,946	92,543	21,402	86,462	69,909	16,552	27,483	22,634	4,850
1995	122,812	101,011	21,802	93,029	75,523	17,507	29,783	25,487	4,295

NOTES: As a result of a new sample design, statistics for 1988-91 have been revised. These statistics now better reflect R&D performance among firms in nonmanufacturing industries and small firms in all industries.

^aSee appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

Appendix table 4-20.
Total expenditures for industrial R&D (financed by company, federal, and other funds), by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total	84,239	87,823	92,155	97,015	102,055	109,727	116,952	119,110	117,400	119,595	132,103	
Manufacturing	77,525	80,377	84,311	86,503	88,024	88,934	88,506	90,177	1,345	86,569	90,749	100,067
Food, kindred, and tobacco products	20,21	D	D	1,206	D	D	1,277	1,386	D	D	1,476	1,566
Textiles and apparel	22,23	D	D	D	D	D	D	D	D	D	D	D
Lumber, wood products, and furniture	24,25	147	144	137	D	192	216	D	D	D	D	D
Paper and allied products	26	D	D	D	879	1,059	D	D	D	D	D	D
Chemicals and allied products	28	8,540	8,843	9,635	11,067	12,069	13,291	14,648	15,381	D	D	D
Industrial chemicals	281-82,286	3,498	3,552	3,716	4,172	4,451	5,010	5,390	5,165	D	D	17,547
Drugs and medicines	283	D	3,658	D	4,906	D	D	7,944	9,146	9,633	10,215	D
Other chemicals	284-85,287-89	D	1,633	D	1,989	D	D	D	2,272	D	D	D
Petroleum refining and extraction	13,29	D	D	1,897	1,997	2,180	2,306	2,498	2,277	2,152	1,950	1,760
Rubber products	30	D	D	D	D	D	D	D	D	D	D	D
Stone, clay, and glass products	32	D	950	995	D	D	D	D	D	538	591	448
Primary metals	33	D	D	730	637	686	739	714	522	669	690	593
Ferrous metals and products	331-32,33398-99	D	D	D	253	D	D	D	D	289	D	D
Nonferrous metals and products	333-36	416	458	D	384	D	D	D	D	380	D	D
Fabricated metal products	34	829	895	783	881	904	939	974	1,017	1,158	1,111	1,023
Machinery	35	12,216	D	D	D	14,446	14,775	14,938	14,938	8,381	8,110	D
Office, computing, and accounting machines	357	D	D	D	D	D	D	D	D	4,950	4,106	D
Other machinery, except electrical	36	14,432	14,980	15,848	14,128	13,318	13,400	13,415	13,360	13,349	15,338	18,751
Electrical equipment	365	D	133	139	149	96	114	D	D	D	3,431	4,004
Radio and TV receiving equipment	366	9,397	9,669	10,184	8,427	7,071	5,928	4,787	D	D	D	D
Communication equipment	367	3,385	D	4,286	4,133	4,025	3,914	D	3,567	5,311	6,032	D
Electronic components	361-64,369	D	D	1,239	1,419	2,126	3,444	D	D	D	D	D
Other electrical equipment	37	D	31,275	34,246	34,775	33,859	31,361	27,428	27,494	27,258	28,087	32,441
Transportation equipment	Motor vehicles and motor vehicles equipment	371	6,984	D	D	D	D	D	D	11,718	D	D
Other transportation equipment	373-75,379	D	D	D	D	D	D	D	D	483	D	D
Aircraft and missiles	372,376	22,231	21,050	24,458	24,168	22,331	20,635	16,629	17,158	15,056	14,260	16,951
Professional and scientific instruments	38	5,013	5,103	5,222	5,530	5,992	7,055	8,705	9,542	10,119	11,441	11,976
Scientific and mechanical measuring instruments	381-82	D	D	D	1,959	2,366	3,346	D	5,156	5,681	6,952	7,146
Optical, surgical, photographic, and other instruments	384-87	D	D	D	3,571	3,626	3,709	D	4,386	4,438	4,489	4,831
Other manufacturing industries	27,31,39	D	382	D	D	D	D	D	D	D	D	D
Nonmanufacturing	6,714	7,446	7,844	10,513	14,031	20,793	28,446	28,933	30,831	28,846	32,036	

Appendix table 4-20.
Total expenditures for industrial R&D (financed by company, federal, and other funds), by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Size												
Fewer than 500 employees		5,866	7,071	7,163	\$	7,809	\$	13,172	13,557	14,620	13,966	16,662
500 to 999		1,648	1,902	1,725	1,669	1,825	2,154	8,000	7,958	3,230	3,608	4,693
1,000 to 4,999		6,240	7,472	7,262	7,622	7,881	8,411	10,453	11,886	13,334	14,617	16,960
5,000 to 9,999		4,022	4,251	4,501	5,245	5,756	6,746	8,049	8,258	9,135	8,912	9,532
10,000 to 24,999		11,109	10,493	12,043	11,506	10,450	12,486	15,770	15,744	15,421	15,972	17,071
25,000 or more		55,354	56,991	59,461	63,694	68,335	71,030	61,508	61,707	61,659	62,519	67,185

D = data have been withheld to avoid disclosing operations of individual companies; S = imputation of more than 50 percent (for years prior to 1993, data have been withheld); SIC = Standard Industrial Classification
 NOTES: As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. As a result of the new sample design, data for 1991 and later years are not directly comparable with data for 1990 and earlier years.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

Appendix table 4-21.
Company and other (except federal) funds for industrial R&D performance, by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total	57,043	59,932	61,403	66,672	73,501	81,602	90,580	94,388	94,591	97,131	108,652	108,652
Manufacturing	52,642	55,192	56,259	59,415	63,199	65,251	67,639	71,025	69,901	73,375	81,236	81,236
Food, kindred, and tobacco products	20,21	1,136	1,280	1,204	1,173	1,244	1,277	1,386	1,345	1,476	1,566	1,566
Textiles and apparel	22,23	218	246	243	215	S	260	236	261	286	316	381
Lumber, wood products, and furniture	24,25	147	144	137	165	192	216	200	234	196	201	229
Paper and allied products	26	576	538	604	752	879	1,059	1,174	1,182	1,191	1,263	1,404
Chemicals and allied products	28	8,310	8,664	9,445	10,828	11,943	13,168	14,439	15,091	16,658	16,559	17,337
Industrial chemicals	281-82,286	3,281	3,374	3,531	3,939	4,340	4,902	5,225	4,911	5,165	4,780	5,139
Drugs and medicines	3,481	3,657	4,095	4,900	5,512	5,917	6,947	7,934	9,132	9,625	10,202	10,202
Other chemicals	284-85,287-89	1,548	1,633	1,819	1,989	2,091	2,349	2,267	2,246	2,361	2,154	1,996
Petroleum refining and extraction	13,29	2,194	1,971	1,883	1,975	2,162	2,289	2,487	2,268	2,138	1,939	1,754
Rubber products	30	659	655	596	718	867	1,056	D	1,256	1,059	1,432	1,210
Stone, clay, and glass products	32	825	941	985	697	615	538	455	479	529	553	441
Primary metals	33	730	786	711	620	666	717	706	514	646	672	580
Ferrous metals and products	331-32,33298-99	323	336	249	252	244	231	225	221	272	241	217
Nonferrous metals and products	333-36	407	450	462	368	422	486	481	293	374	431	363
Fabricated metal products	34	780	800	633	718	726	736	748	723	936	868	937
Machinery	35	10,721	10,701	10,577	11,929	13,342	13,575	13,720	13,903	8,295	8,011	9,676
Office, computing, and accounting machines	357	8,418	8,380	8,193	9,347	10,725	10,988	10,419	10,614	4,917	4,078	4,699
Other machinery, except electrical	351-56,358-59	2,303	2,321	2,384	2,582	2,618	2,587	3,301	3,289	3,378	3,933	4,976
Electrical equipment	36	9,271	9,767	10,449	9,975	9,575	9,267	8,865	9,516	11,682	13,537	17,060
Radio and TV receiving equipment	365	350	133	139	149	96	114	D	93	87	64	114
Communication equipment	366	5,174	5,117	5,455	4,798	4,159	3,584	S	3,381	3,954	4,939	3,845
Electronic components	367	2,826	3,357	3,630	3,684	3,655	3,496	3,177	3,320	5,105	5,870	9,628
Other electrical equipment	361-64,369	921	1,160	1,225	1,345	1,664	2,073	D	2,722	2,537	2,664	3,473
Transportation equipment	37	12,092	13,567	13,462	13,910	14,596	14,264	14,858	16,292	16,640	17,695	19,311
Motor vehicles and motor vehicles equipment	371	6,164	7,171	7,167	7,783	8,756	8,594	9,063	9,132	10,659	11,950	13,590
Other transportation equipment	373-75,379	279	330	356	361	337	283	262	289	297	279	232
Aircraft and missiles	372,376	5,649	6,066	5,939	5,766	5,503	5,387	5,533	6,871	5,684	5,466	5,489
Professional and scientific instruments	38	4,622	4,752	4,950	5,339	5,729	6,318	6,840	7,321	7,542	8,058	8,516
Scientific and mechanical measuring instruments	381-82	1,596	1,521	1,598	1,863	2,205	2,696	3,017	3,013	3,196	3,687	3,787
Optical, surgical, photographic, and other instruments	384-87	3,026	3,231	3,352	3,476	3,524	3,621	3,823	4,308	4,346	4,371	4,729
Other manufacturing industries	27,31,39	361	380	401	438	541	D	599	758	796	835	835
Nonmanufacturing	4,401	4,740	5,144	7,257	10,302	16,351	22,941	23,363	24,690	23,756	27,415	27,415

Appendix table 4-21.
Company and other (except federal) funds for industrial R&D performance, by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Size												
Fewer than 500 employees.....	5,127	6,203	6,200	\$	\$	\$	\$	11,285	11,532	13,006	12,802	14,684
500 to 999	1,531	1,765	1,610	1,748	1,934	2,144	7,819	7,807	3,048	3,426	4,468	
1,000 to 4,999	5,249	6,243	6,281	6,820	7,546	8,363	9,403	10,865	12,219	13,533	16,162	
5,000 to 9,999	3,350	3,455	3,753	4,075	4,509	4,997	7,233	7,495	8,371	8,087	9,289	
10,000 to 24,999	8,366	8,489	9,681	10,512	11,631	12,890	12,397	12,328	12,606	13,625	15,125	
25,000 or more	33,420	33,777	33,878	36,785	40,703	45,106	42,443	44,361	45,340	45,658	48,924	

D = data have been withheld to avoid disclosing operations of individual companies; S = imputation of more than 50 percent (for years prior to 1993, data have been withheld); SIC = Standard Industrial Classification

NOTES: Company funds include funds for industrial R&D work performed within company facilities from all sources except the Federal Government. The funds may be the companies' own or from outside organizations such as research institutions, universities and colleges, nonprofit organizations, other companies, and state governments. Company-financed R&D not performed within the company is excluded. As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. As a result of the new sample design, data for 1991 and later years are not directly comparable with data for 1990 and earlier years.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

See text table 4-3.

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Appendix table 4-22.
Federal funds for industrial R&D performance, by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total		27,196	27,891	30,752	30,343	28,554	28,125	26,372	24,722	22,809	22,463	23,451
Manufacturing		24,883	25,185	28,052	27,088	24,826	23,683	20,867	19,152	16,669	17,373	18,831
Food, kindred, and tobacco products	20,21	D	D	2	D	D	D	0	0	0	0	0
Textiles and apparel	22,23	D	D	D	D	D	D	S	D	D	D	D
Lumber, wood products, and furniture	24,25	0	0	0	D	0	0	D	D	D	D	D
Paper and allied products	26	D	D	D	D	0	0	D	D	D	D	D
Chemicals and allied products	28	230	179	190	238	126	123	209	S	D	D	210 S
Industrial chemicals	281-82,286	217	178	185	232	111	109	165	S	D	D	D
Drugs and medicines	283	D	1	D	6	D	D	D	D	S	15	8
Other chemicals	284-85,287-89	D	0	D	0	D	D	D	D	S	D	D
Petroleum refining and extraction	13,29	D	D	14	22	S	S	11	9	14	10	6
Rubber products	30	D	D	D	D	D	D	D	D	D	D	D
Stone, clay, and glass products	32	D	9	10	D	D	D	D	D	D	9	38
Primary metals	33	D	D	19	17	22	D	8	S	23	17	13
Ferrous metals and products	331-32,3398,99	D	D	D	1	D	D	1	D	17	D	D
Nonferrous metals and products	333-36	9	8	D	16	D	D	7	D	6	D	D
Fabricated metal products	34	49	95	150	163	178	203	226	294	222	243	86
Machinery	35	1,495	D	D	D	D	871	1,055	1,035	86	99	D
Office, computing, and accounting machines	357	D	D	D	D	D	D	D	D	33	28	D
Other machinery, except electrical	351-56,358-59	D	75	44	101	112	D	D	D	53	71	64
Electrical equipment	36	5,161	5,213	5,399	4,153	3,743	4,133	4,550	3,844	1,667	1,801	1,690
Radio and TV receiving equipment	365	D	0	0	0	0	0	0	D	D	D	D
Communication equipment	366	4,223	4,552	4,729	3,630	2,911	2,344	D	D	D	D	D
Electronic components	367	559	D	656	449	369	418	D	247	206	162	D
Other electrical equipment	361-64,369	D	D	14	74	463	1,371	D	D	D	D	D
Transportation equipment	36	D	17,708	20,784	20,865	19,262	17,097	12,570	11,202	10,617	10,392	13,130
Motor vehicles and motor vehicles equipment	371	820	D	D	D	D	D	D	D	D	D	D
Other transportation equipment	373-75,379	D	D	D	D	D	D	D	D	D	D	D
Aircraft and missiles	372-376	16,582	14,984	18,519	18,402	16,828	15,248	11,096	S	9,372	8,794	11,462
Professional and scientific instruments	38	391	351	272	191	263	737	1,865	2,221	2,577	3,384	3,460 S
Scientific and mechanical measuring instruments	381-82	D	D	D	S	S	S	D	2,143	2,484	3,266	3,358 S
Optical, surgical, photographic, and other instruments	384-87	D	D	D	95	101	87	D	78	92	118	102
Other manufacturing industries	27,31,39	D	2	D	D	D	D	61	D	D	D	D
Nonmanufacturing industries	2,313	2,706	2,700	3,256	3,729	4,442	5,505	5,570	6,140	5,090	4,620	

Appendix table 4-22.
Federal funds for industrial R&D performance, by industry and size of company: 1985-95
 (Millions of current dollars)

Industry and size of company	SIC Code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Size												
Fewer than 500 employees	739	868	963	816	901	895	1,887	2,025	1,614	1,164	1,164	1,978
500 to 999	117	137	115	131	117	S	181	151	182	182	182	225
1,000 to 4,999	991	1,229	981	1,093	958	881	1,050	S	1,115	1,083	1,083	798
5,000 to 9,999	672	796	748	864	740	257	816	763	764	825	825	243
10,000 to 24,999	2,743	2,004	2,362	1,705	1,129	1,526	3,373	3,416	2,816	2,348	1,946	S
25,000 or more	21,934	23,213	25,583	25,734	24,709	24,436	19,065	17,346	16,319	16,862	16,862	18,261

D = data have been withheld to avoid disclosing operations of individual companies; S = imputation of more than 50 percent (for years prior to 1993, data have been withheld);

SIC = Standard Industrial Classification

NOTE: As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

Appendix table 4-23.

The 100 leading industrial R&D companies, ranked by size of R&D expenditures in 1996

1996 rank	1986 rank	Company	R&D expenditures (millions)	R&D/net sales (%)
1	1	General Motors	8,900.0	5.6
2	3	Ford Motor	6,821.0	4.6
3	2	IBM	3,934.0	5.2
4	9	Hewlett-Packard	2,718.0	7.1
5	20	Motorola	2,394.0	8.6
6	4	Lucent Technologies ^a	2,056.0	13.0
7	66	TRW ^a	1,981.0	20.1
8	18	Johnson & Johnson	1,905.0	8.8
9	46	Intel	1,808.0	8.7
10	31	Pfizer	1,684.0	14.9
11	12	Chrysler	1,600.0	2.7
12	22	Merck	1,487.3	7.5
13	—	Microsoft	1,432.0	16.5
14	47	American Home Products	1,429.1	10.1
15	5	General Electric	1,421.0	1.8
16	35/63	Bristol Myers Squibb	1,276.0	8.5
17	33	Pharmacia & Upjohn	1,266.0	17.4
18	23	Procter & Gamble	1,221.0	3.5
19	38	Abbott Laboratories	1,204.8	10.9
20	11	Boeing	1,200.0	5.3
21	26	Lilly	1,189.5	16.2
22	26	Texas Instruments	1,181.0	11.9
23	8	United Technologies	1,122.0	4.8
24	10	Digital Equipment	1,062.3	7.3
25	13	Xerox	1,044.0	6.0
26	6	Dupont	1,032.0	2.7
27	7	Eastman Kodak	1,028.0	6.4
28	16	3M	947.0	6.7
29	—	Rhone-Poulenc	882.1	16.3
30	21/51	Lockheed Martin	784.0	2.9
31	15	Dow Chemical	761.0	3.8
32	17	Monsanto	728.0	7.9
33	53	Schering-Plough	722.8	12.8
34	28	Rockwell International	691.0	6.7
35	—	Sun Microsystems, Inc.	657.1	9.3
36	4	AT&T ^a	640.0	1.2
37	75	Apple Computer	604.0	6.1
38	58	Warner-Lambert	554.8	7.7
39	54	ITT Industries	535.2	6.1
40	—	Amgen	528.3	23.6
41	14	Exxon	520.0	0.4
42	—	Seagate Technology	519.1	6.0
43	78	Philip Morris	515.0	0.9
44	—	Applied Materials	481.4	11.6
45	32	NCR	444.0	6.4
46	—	Genentech	434.1	51.3
47	61	Caterpillar	410.0	2.5
48	—	Compaq Computer	407.0	2.2
49	60	Advanced Micro Devices	400.7	20.5
50	—	Cisco Systems	399.3	9.7
51	67	Emerson Electric	398.7	3.6
52	37	Goodyear Tire & Rubber	374.5	2.9
53	—	Chiron	371.1	30.7
54	49	Deere	370.3	3.3

Appendix table 4-23.

The 100 leading industrial R&D companies, ranked by size of R&D expenditures in 1996

1996 rank	1986 rank	Company	R&D expenditure (millions)	R&D/net sales (%)
55	19	McDonnell Douglas	355.0	2.6
56	–	Silicon Graphics	353.5	12.1
57	42	Honeywell	353.3	4.8
58	99	Tandem Computers	345.4	18.2
59	24	AlliedSignal	345.0	2.5
60	25	Unisys	342.9	5.4
61	56	Baxter International	340.0	6.3
62	41	Raytheon	323.3	2.6
63	62	AMP	315.1	5.8
64	–	Novell	275.6	20.0
65	45	Mobil	275.0	0.4
66	73	Eaton	267.0	3.8
67	29	Northrop Grumman	255.0	3.2
68	–	Bay Networks	253.2	12.3
69	–	Automatic Data Processing	249.6	7.0
70	55	PPG Industries	239.1	3.3
71	–	Cummins Engine	235.0	4.5
72	–	Boston Scientific	212.3	14.5
73	–	Genzyme	211.5	40.8
74	–	DSC Communications	210.1	15.2
75	82	Ingersoll-Rand	209.3	3.1
76	–	General Instrument	209.3	7.8
77	83	Kimberly-Clark	207.9	1.6
78	–	Gillette	204.0	2.1
79	–	LSI Logic	200.5	16.2
80	–	Whirlpool	197.0	2.3
81	–	Case	193.0	3.6
82	–	Micron Technology	191.9	5.3
83	86	Corning	191.3	5.2
84	–	RJR Nabisco	191.0	1.1
85	69	FMC	189.4	3.8
86	74	Rohm & Haas	187.0	4.7
87	84	Textron	185.0	2.0
88	–	Eastman Chemical	184.0	3.8
89	48	Chevron	182.0	0.5
90	–	Tellabs	181.9	20.9
91	–	Analog Devices	177.8	14.9
92	–	Storage Technology	176.4	8.7
93	–	Lam Research	173.0	13.6
94	44	Shell Oil	173.0	0.6
95	–	Sybase	172.0	17.0
96	52	Amoco	171.0	0.5
97	72	Alcoa	165.5	1.3
98	–	Johnson Controls	165.0	1.6
99	–	Dana	164.0	2.1
100	64	NYNEX	163.1	1.2

– = company unranked in 1986; X/X = 1986 ranking of each company before merger

^aLucent Technologies was split off from AT&T in 1996. TRW restated its R&D expenses reported to the Securities and Exchange Commission in 1996 to include all "sponsor-supported" R&D, which means that federal R&D funds are now included in the company's total.SOURCE: Technical Insights, *Inside R&D*, weekly newsletter (Englewood, NJ: John Wiley & Sons, Inc.).

Appendix table 4-24.

Concentration of total, federal, company, and other R&D funds and net sales of R&D-performing companies, by size of R&D program: 1985-95

Companies ranked by size of R&D program	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Percent of total (company, federal, and other) R&D funds											
First 4 (1-4)	18	19	19	18	19	18	16	15	17	15	16
Next 4 (5-8)	12	11	12	12	13	13	8	8	7	8	8
Next 12 (9-20)	17	14	16	17	16	15	12	13	13	14	13
Next 20 (21-40)	13	13	12	12	12	12	11	11	12	13	12
Next 60 (41-100)	16	15	14	15	15	16	15	15	16	15	14
Next 100 (101-200) ...	9	10	8	8	8	9	12	12	8	9	8
Next 200 (201-400) ...	5	8	6	7	6	7	6	6	7	7	7
Percent of federal R&D funds											
First 4 (1-4)	29	30	31	31	36	38	14	11	23	26	35
Next 4 (5-8)	15	16	18	18	15	16	21	18	17	19	19
Next 12 (9-20)	27	28	27	27	30	26	21	27	32	32	27
Next 20 (21-40)	16	15	15	15	11	12	15	13	16	13	8
Next 60 (41-100)	7	7	7	6	6	6	13	11	5	7	5
Next 100 (101-200) ...	2	2	1	3	1	1	3	4	5	2	3
Next 200 (201-400) ...	0	1	0	0	0	0	2	2	2	1	3
Percent of company and other (except federal) R&D funds											
First 4 (1-4)	23	20	20	21	22	21	17	17	17	16	16
Next 4 (5-8)	7	7	7	7	7	7	7	8	7	7	7
Next 12 (9-20)	12	12	12	12	13	12	10	12	12	12	11
Next 20 (21-40)	12	10	11	12	12	13	10	11	11	11	11
Next 60 (41-100)	18	16	16	16	16	17	16	17	14	14	14
Next 100 (101-200) ...	10	10	10	10	10	10	15	14	9	9	9
Next 200 (201-400) ...	7	8	8	8	8	8	7	7	8	8	8
Percent of net sales ranked by size of total R&D funds											
First 4 (1-4)	8	8	7	7	6	8	7	8	8	8	8
Next 4 (5-8)	4	5	5	5	5	4	3	3	3	2	2
Next 12 (9-20)	5	5	5	5	5	5	4	4	4	5	6
Next 20 (21-40)	8	7	7	6	5	5	4	4	4	5	4
Next 60 (41-100)	12	10	11	11	12	12	12	12	11	10	9
Next 100 (101-200) ...	13	10	8	9	8	9	9	9	8	8	8
Next 200 (201-400) ...	15	9	12	10	11	12	11	11	10	10	10

NOTES: Companies were ranked individually for each year; therefore, particular companies comprising the size groups may have changed from year to year. As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. See the technical notes for more information.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

Science & Engineering Indicators – 1998

Appendix table 4-25.
Company and other (except federal) R&D funds as a percentage of net sales for industrial R&D performance, by industry and size of company: 1985-95
(Percentages)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7	2.8
Manufacturing	3.0	3.2	3.1	3.1	3.1	3.1	3.2	3.3	3.1	2.9	2.9	2.9
Food, kindred, and tobacco products	20,21	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Textiles and apparel	22,23	0.5	0.5	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.6	0.9
Lumber, wood products, and furniture	24,25	0.8	0.6	0.6	0.6	0.6	0.6	0.9	0.9	0.7	0.6	0.7
Paper and allied products	26	0.8	0.7	0.6	0.8	0.8	1.0	1.1	1.0	1.1	1.0	1.0
Chemicals and allied products	28	4.9	5.1	5.2	5.2	5.4	5.3	5.4	6.0	5.1	4.7	4.7
Industrial chemicals	281-82,286	4.2	4.4	4.4	4.2	4.1	4.4	4.4	4.4	4.4	3.3	3.9
Drugs and medicines	283	8.0	8.4	8.7	8.8	8.9	8.8	8.9	9.6	12.5	10.2	10.4
Other chemicals	284-85,287-89	3.1	3.3	3.3	3.4	3.9	3.4	3.0	2.7	2.7	2.5	1.4
Petroleum refining and extraction	13,29	0.9	1.1	1.0	1.0	0.9	0.9	1.0	0.9	0.9	0.8	0.7
Rubber products	30	1.8	1.7	1.6	1.7	1.9	2.1	2.3	2.3	2.1	2.3	1.6
Stone, clay, and glass products	32	2.3	2.4	2.5	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.5
Primary metals	33	0.9	1.0	0.9	0.7	0.7	0.8	0.8	0.6	0.7	0.6	0.5
Ferrous metals and products	331-32,33398-99	0.5	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3
Nonferrous metals and products	333-36	1.4	1.5	1.3	1.0	1.0	1.2	1.2	0.7	1.2	0.9	0.7
Fabricated metal products	34	1.4	1.4	1.2	1.1	1.2	1.1	1.2	1.1	1.1	1.0	1.1
Machinery	35	6.7	7.3	7.1	6.8	7.3	7.2	7.5	7.3	4.5	3.8	3.6
Office, computing, and accounting machines	357	12.4	12.3	11.2	13.1	14.4	14.9	13.7	9.8	9.8	8.1	8.1
Other machinery, except electrical	351-56,358-59	2.6	2.9	3.0	2.8	2.6	2.3	2.9	2.5	2.5	2.4	2.4
Electrical equipment	36	4.8	5.1	5.4	5.3	5.2	4.5	4.3	4.0	5.4	5.2	5.4
Radio and TV receiving equipment	365	4.3	3.6	3.2	2.4	1.8	1.6	1.0	0.6	4.0	1.0	1.6
Communication equipment	366	5.4	5.2	5.5	6.1	6.8	6.1	S	7.0	10.1	10.3	8.0
Electronic components	367	8.2	9.2	8.5	8.0	7.7	7.4	7.2	7.0	7.8	7.3	8.0
Other electrical equipment	361-64,369	2.0	2.2	2.6	2.3	2.3	2.2	2.2	2.1	2.3	2.1	2.5
Transportation equipment	37	3.4	3.6	3.4	3.5	3.5	3.4	4.0	4.2	3.9	3.7	3.6
Motor vehicles and motor vehicles equipment	371	3.1	3.3	3.4	3.4	3.7	3.7	4.1	4.0	3.7	3.4	3.6
Other transportation equipment	373-75,379	2.3	2.7	2.5	2.6	2.5	2.1	2.1	1.9	1.2	0.9	0.9
Aircraft and missiles	372,376	3.9	4.0	3.6	3.9	3.3	3.1	4.0	4.7	5.3	4.2	7.3
Professional and scientific instruments	38	8.3	8.2	7.5	7.1	6.8	7.1	7.1	7.2	7.2	6.5	7.3
Scientific and mechanical measuring instruments	381-82	8.4	8.4	8.1	7.6	6.9	6.9	6.3	6.2	6.4	5.8	6.6
Optical, surgical, photographic, and other instruments	384-87	8.1	8.0	7.2	7.1	7.1	7.5	8.0	8.2	7.9	7.2	8.0
Other manufacturing industries	27,31,39	1.0	1.2	1.1	1.0	0.9	0.9	0.8	1.3	1.3	1.1	1.2
Nonmanufacturing	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.2	2.4

Appendix table 4-25.
Company and other (except federal) R&D funds as a percentage of net sales for industrial R&D performance, by industry and size of company: 1985-95
(Percentages)

Industry and size of company	SIC code	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total^a	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7	2.8
Fewer than 500 employees.....	3.4	4.0	3.8	3.7	3.5	3.3	3.2	3.2	3.6	2.5	3.9	
500 to 999	2.2	2.2	2.2	1.7	1.7	1.7	2.4	2.7	2.7	2.5	3.0	
1,000 to 4,999	2.4	2.4	2.4	2.3	2.3	2.1	1.9	2.4	2.7	2.5	2.6	
5,000 to 9,999	1.8	2.0	2.0	2.0	2.1	2.1	2.8	2.9	2.8	2.2	2.0	
10,000 to 24,999	2.5	2.6	2.5	2.6	2.5	2.5	3.0	2.6	2.5	2.5	2.0	
25,000 or more	3.5	3.7	3.8	3.7	3.7	3.6	3.8	4.0	3.7	3.6	3.1	

NA = not available; SIC = Standard Industrial Classification

NOTES: As a result of a new sample design, statistics for 1988-91 have been revised since originally published. These statistics now better reflect R&D performance among firms in the nonmanufacturing industries and small firms in all industries. As a result of the new sample design, data for 1991 and later years are not directly comparable with data for 1990 and earlier years.

^aBeginning with data from the 1995 survey (in which 1994 data were also collected), this table includes both manufacturing and nonmanufacturing companies. Only manufacturing companies were included in prior years.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

See figure 4-11 and text table 4-4.

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Appendix table 4-26.

Trends in R&D and federal outlays: FYs 1980, 1990, and proposed 1998

Composition of federal outlays	1980	1990	1998
Billions of current dollars			
Mandatory programs ^a	262.3	568.5	890.1
Net interest	52.5	184.2	249.9
Defense discretionary	134.6	300.1	260.1
R&D outlays	15.0	41.6	38.3
International discretionary	12.8	19.1	19.3
R&D outlays	0.1	0.4	0.3
Domestic discretionary	128.7	181.2	268.0
Nondefense R&D outlays	16.7	23.3	34.0
Total federal outlays	590.9	1,253.1	1,687.5
Total R&D	31.8	65.3	72.7
Percentages			
Total R&D/total federal outlays	5.4	5.2	4.3
Nondefense R&D/total federal outlays	2.8	1.9	2.0
Total R&D/total discretionary	11.5	13.0	13.3
Nondefense R&D/domestic discretionary	13.0	12.9	12.7

^aThese include Social Security, Medicare, Medicaid, and other programs.

SOURCE: American Association for the Advancement of Science, *Research and Development: FY 1998* (Washington, DC: 1997).

See figure 4-12.

Science & Engineering Indicators – 1998

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Millions of current dollars						
												TOTAL R&D						
Total, all agencies	55,254	56,769	61,407	63,560	61,295	65,593	67,314	67,256	68,755	69,077	68,064							
Dept. of Agriculture	948	1,017	1,038	1,108	1,237	1,327	1,328	1,400	1,380	1,352	1,369							
Dept. of Commerce	402	389	398	438	490	651	826	1,136	1,136	1,173	1,096							
Dept. of Defense	35,232	35,249	37,577	37,268	32,135	36,130	35,849	34,566	34,362	34,284	32,964							
Dept. of Education	133	141	159	170	171	169	178	177	178	182	188							
Dept. of Energy	4,757	5,036	5,193	5,631	5,983	6,172	6,262	6,048	6,145	5,676	5,895							
Dept. of Health & Human Services	6,606	7,158	7,903	8,406	9,756	8,988	10,349	11,022	11,455	11,914	12,185							
Dept. of the Interior	404	417	469	509	593	609	619	694	562	565	574							
Dept. of Justice	42	43	38	41	49	48	49	45	45	58	94							
Dept. of Transportation	325	365	303	367	380	445	545	621	727	641	706							
Dept. of the Treasury	27	26	26	26	31	25	17	19	61	64	64							
Dept. of Veterans Affairs	210	215	235	238	217	224	236	248	238	276	258							
Environmental Protection Agency	348	347	380	420	433	484	495	554	552	457	581							
Agency for International Development	218	204	279	335	378	366	382	254	303	247	187							
National Aeronautics & Space																		
Administration	3,787	4,330	5,394	6,533	7,280	7,658	8,020	8,296	9,015	9,614	9,204							
National Science Foundation	1,471	1,533	1,670	1,690	1,785	1,868	1,882	2,040	2,149	2,142	2,279							
Nuclear Regulatory Commission	123	109	115	109	109	119	120	91	88	59	59							
Smithsonian Institution	72	75	80	84	98	98	102	124	124	125	137							
Tennessee Valley Authority	78	87	63	65	68	97	109	98	93	103	77							
All other agencies	73	88	87	125	104	116	116	134	130	122	148							
BASIC RESEARCH																		
Total, all agencies	8,942	9,474	10,602	11,286	12,171	12,490	13,399	13,553	13,896	14,482	14,732							
Dept. of Agriculture	446	481	485	519	558	595	616	606	595	586	608							
Dept. of Commerce	26	31	29	31	34	35	37	40	39	38	39							
Dept. of Defense	908	877	948	948	994	1,099	1,268	1,222	1,264	1,134	1,146							
Dept. of Education	3	4	4	5	9	8	5	6	6	4	4							
Dept. of Energy	1,069	1,185	1,411	1,505	1,687	1,736	1,755	1,603	1,634	1,957	2,035							
Dept. of Health & Human Services	3,828	4,081	4,388	4,649	5,050	5,059	5,697	5,884	6,061	6,442	6,558							
Dept. of the Interior	135	127	189	205	229	231	230	83	55	56	57							
Dept. of Justice	8	8	7	9	6	5	5	6	8	8	12							
Dept. of Transportation	0	0	0	0	0	1	2	3	47	46	54							
Dept. of the Treasury	5	5	3	3	4	4	7	-	-	0	-							
Dept. of Veterans Affairs	17	17	17	16	16	16	13	14	12	14	14							
Environmental Protection Agency	31	27	51	74	91	110	89	101	70	66	75							
Agency for International Development	3	3	3	5	6	6	8	2	2	2	5							
National Aeronautics & Space																		
Administration	1,014	1,113	1,417	1,637	1,706	1,738	1,800	1,964	1,978	2,009	1,885							
National Science Foundation	1,371	1,433	1,563	1,586	1,676	1,742	1,744	1,871	1,973	1,968	2,090							
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0							
Smithsonian Institution	72	75	80	84	98	98	102	124	124	125	137							
Tennessee Valley Authority	4	3	5	2	2	10	9	9	9	12	0							
All other agencies	5	4	4	5	6	11	14	17	17	16	15							

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
APPLIED RESEARCH											
Total, all agencies	8,998	9,177	10,164	10,337	11,798	12,001	13,491	13,888	14,678	14,096	14,441
Dept. of Agriculture	473	505	517	542	618	666	636	716	705	686	678
Dept. of Commerce	313	312	322	346	415	561	545	678	853	861	830
Dept. of Defense	2,440	2,362	2,708	2,582	2,724	2,975	3,515	3,040	3,070	2,814	2,716
Dept. of Education	104	107	118	125	123	120	128	131	133	138	140
Dept. of Energy	1,029	1,051	1,021	1,066	1,587	1,676	1,685	1,679	1,826	1,343	1,541
Dept. of Health & Human Services	2,194	2,416	2,700	2,818	3,112	2,887	3,496	3,853	4,015	4,083	4,210
Dept. of the Interior	247	266	253	270	324	340	350	567	477	484	489
Dept. of Justice	12	10	11	11	15	15	21	20	18	19	23
Dept. of Transportation	69	91	121	119	115	156	224	270	324	288	340
Dept. of the Treasury	13	11	13	15	21	17	5	9	49	50	54
Dept. of Veterans Affairs	173	179	197	199	178	185	194	209	206	239	223
Environmental Protection Agency	246	241	223	242	262	294	272	301	331	286	336
Agency for International Development	151	132	216	300	352	294	351	214	270	224	168
National Aeronautics & Space Administration	1,256	1,219	1,461	1,424	1,666	1,491	1,749	1,877	2,068	2,272	2,356
National Science Foundation	99	100	108	103	109	109	119	170	176	174	189
Nuclear Regulatory Commission	123	109	115	109	0	0	0	91	88	59	59
Smithsonian Institution	0	0	0	0	0	0	0	0	0	0	0
Tennessee Valley Authority	14	15	12	17	17	22	18	17	17	19	14
All other agencies	43	53	49	49	52	56	45	45	52	55	77
DEVELOPMENT											
Total, all agencies	37,313	38,119	40,641	41,937	37,327	41,102	40,424	39,815	40,181	40,499	38,890
Dept. of Agriculture	29	31	36	47	61	66	76	77	80	80	82
Dept. of Commerce	64	47	47	61	40	55	74	108	244	275	227
Dept. of Defense	31,884	32,010	33,921	33,739	28,417	32,056	31,066	30,304	30,028	30,336	29,103
Dept. of Education	26	30	37	40	39	42	44	40	39	40	45
Dept. of Energy	2,659	2,801	2,761	3,060	2,710	2,760	2,822	2,766	2,685	2,376	2,320
Dept. of Health & Human Services	584	661	814	939	1,594	1,042	1,157	1,285	1,379	1,390	1,417
Dept. of the Interior	22	24	27	33	40	39	39	44	29	26	27
Dept. of Justice	23	26	21	21	28	28	23	19	32	54	59
Dept. of Transportation	256	213	183	247	265	288	319	347	356	307	311
Dept. of the Treasury	10	10	9	7	7	4	6	10	12	13	11
Dept. of Veterans Affairs	19	19	21	22	23	23	29	25	19	22	22
Environmental Protection Agency	71	80	107	105	80	80	134	151	150	105	170
Agency for International Development	64	69	60	29	20	66	23	38	30	20	14
National Aeronautics & Space Administration	1,518	1,999	2,515	3,473	3,909	4,428	4,471	4,456	4,969	5,332	4,964
National Science Foundation	0	0	0	0	0	0	0	0	0	0	0
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0
Smithsonian Institution	0	0	0	0	0	0	0	0	0	0	0
Tennessee Valley Authority	60	69	48	43	50	73	81	72	67	72	63
All other agencies	26	31	34	72	46	53	61	74	62	51	55

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
R&D PLANT											
Total, all agencies	1,846	2,057	2,165	2,272	2,853	2,985	3,101	2,171	2,257	1,971	2,085
Dept. of Agriculture	112	135	89	102	145	165	142	126	143	150	125
Dept. of Commerce	5	11	9	15	16	21	25	31	78	80	106
Dept. of Defense	477	436	499	487	426	397	372	222	65	85	40
Dept. of Education	21	5	2	9	4	2	2	2	2	0	0
Dept. of Energy	772	915	873	916	1,220	1,321	1,462	912	745	756	826
Dept. of Health & Human Services	37	20	79	108	86	97	149	120	256	304	429
Dept. of the Interior	12	9	11	14	22	18	23	9	7	2	7
Dept. of Justice	11	0	0	0	0	0	0	0	0	0	0
Dept. of Transportation	11	14	16	22	18	25	32	41	29	29	23
Dept. of the Treasury	0	0	0	0	0	0	0	0	0	0	0
Dept. of Veterans Affairs	6	20	11	3	3	6	3	12	7	4	4
Environmental Protection Agency	0	0	0	0	0	0	0	3	5	5	5
Agency for International Development	7	6	0	0	0	0	0	0	0	0	0
National Aeronautics & Space Administration	309	428	520	527	724	818	749	515	625	333	315
National Science Foundation	61	57	54	39	160	102	130	172	290	219	200
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0
Smithsonian Institution	3	1	3	5	2	4	5	5	5	5	5
Tennessee Valley Authority	0	0	0	5	5	3	1	0	1	1	0
All other agencies	1	0	0	19	23	7	1	0	0	0	0
R&D AND R&D PLANT											
Total, all agencies	57,100	58,827	63,572	65,831	64,148	68,577	70,415	69,427	71,012	71,048	70,149
Dept. of Agriculture	1,060	1,152	1,128	1,211	1,381	1,492	1,470	1,525	1,523	1,502	1,494
Dept. of Commerce	408	400	407	454	505	672	682	857	1,214	1,252	1,201
Dept. of Defense	35,709	35,685	38,076	37,756	32,561	36,526	36,221	34,788	34,427	34,427	33,004
Dept. of Education	154	146	161	179	175	171	180	178	179	182	188
Dept. of Energy	5,529	5,951	6,066	6,547	7,203	7,493	7,724	6,960	6,890	6,432	6,721
Dept. of Health & Human Services	6,643	7,178	7,981	8,513	9,842	9,085	10,499	11,142	11,711	12,218	12,614
Dept. of the Interior	416	426	480	523	615	628	642	703	568	568	581
Dept. of Justice	54	43	38	41	49	48	49	45	58	81	94
Dept. of Transportation	336	319	319	388	398	470	578	662	756	671	728
Dept. of the Treasury	27	26	26	31	25	17	17	19	62	64	65
Dept. of Veterans Affairs	215	235	246	241	220	230	240	260	245	280	262
Environmental Protection Agency	348	347	380	420	433	484	498	558	556	462	586
Agency for International Development	224	211	279	335	378	366	382	303	247	187	187
National Aeronautics & Space Administration	4,097	4,759	5,913	7,060	8,004	8,475	8,769	8,812	9,640	9,946	9,519
National Science Foundation	1,532	1,590	1,724	1,729	1,945	1,970	2,012	2,212	2,439	2,361	2,479
Nuclear Regulatory Commission	123	109	115	109	109	119	120	91	88	59	59
Smithsonian Institution	74	76	84	89	100	102	107	129	129	130	142
Tennessee Valley Authority	78	88	63	70	73	101	110	98	94	104	77
All other agencies	74	88	87	144	127	122	117	134	130	122	148

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Millions of constant 1992 dollars					
												TOTAL R&D					
Total, all agencies	66,651	66,165	68,687	68,197	63,061	65,593	65,608	64,053	63,899	62,740	60,287						
Dept. of Agriculture	1,143	1,185	1,161	1,189	1,272	1,327	1,294	1,333	1,282	1,228	1,212						
Dept. of Commerce	485	453	445	470	504	651	640	787	1,056	1,065	971						
Dept. of Defense	42,499	41,083	42,032	39,987	33,060	36,130	34,941	32,920	31,935	31,139	29,198						
Dept. of Education	160	164	178	182	176	169	173	168	165	165	167						
Dept. of Energy	5,738	5,870	5,808	6,041	6,155	6,172	6,103	5,760	5,711	5,155	5,222						
Dept. of Health & Human Services	7,969	8,343	8,840	9,019	10,037	8,988	10,087	10,497	10,646	10,821	10,793						
Dept. of the Interior	487	486	525	546	610	609	603	661	522	523	508						
Dept. of Justice	51	50	43	43	50	48	48	43	43	54	73	83					
Dept. of Transportation	392	355	339	393	391	445	531	591	676	583	625						
Dept. of the Treasury	32	30	29	27	32	25	16	18	57	58	57						
Dept. of Veterans Affairs	253	251	263	255	223	224	230	236	221	251	229						
Environmental Protection Agency	420	405	425	450	445	484	483	527	513	415	515						
Agency for International Development	262	238	312	359	389	366	373	242	281	224	165						
National Aeronautics & Space Administration	4,568	5,047	6,033	7,010	7,490	7,658	7,817	7,901	8,378	8,732	8,153						
National Science Foundation	1,774	1,786	1,868	1,813	1,837	1,868	1,834	1,943	1,997	1,945	2,019						
Nuclear Regulatory Commission	148	126	128	117	112	119	117	86	82	54	52						
Smithsonian Institution	86	88	90	90	101	98	99	118	115	114	121						
Tennessee Valley Authority	94	102	70	70	70	97	106	93	87	94	68						
All other agencies	88	103	98	134	107	116	113	128	121	111	131						
BASIC RESEARCH																	
Total, all agencies	10,787	11,041	11,859	12,109	12,521	12,490	13,060	12,908	12,914	13,154	13,049						
Dept. of Agriculture	537	560	542	557	574	595	600	577	553	533	538						
Dept. of Commerce	31	36	33	34	35	35	36	38	37	34	34						
Dept. of Defense	1,095	1,022	1,060	1,017	1,023	1,099	1,236	1,164	1,175	1,030	1,015						
Dept. of Education	4	5	5	9	8	5	5	5	5	5	3						
Dept. of Energy	1,289	1,381	1,578	1,615	1,735	1,736	1,710	1,527	1,519	1,777	1,802						
Dept. of Health & Human Services	4,617	4,757	4,908	4,988	5,196	5,059	5,552	5,604	5,633	5,851	5,809						
Dept. of the Interior	163	147	211	220	236	231	224	224	224	224	224						
Dept. of Justice	10	9	8	9	7	5	5	5	6	8	8						
Dept. of Transportation	0	0	0	0	0	1	2	3	4	42	48						
Dept. of the Treasury	6	6	4	4	4	4	4	6	0	0	0						
Dept. of Veterans Affairs	21	20	19	17	17	16	13	14	12	13	12						
Environmental Protection Agency	38	32	57	79	94	110	87	97	65	60	67						
Agency for International Development	3	3	3	5	6	6	8	2	2	2	4						
National Aeronautics & Space Administration	1,223	1,297	1,585	1,756	1,738	1,754	1,738	1,870	1,838	1,825	1,670						
National Science Foundation	1,654	1,670	1,748	1,702	1,724	1,742	1,700	1,782	1,834	1,787	1,851						
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0						
Smithsonian Institution	86	88	90	101	98	99	118	115	114	114	121						
Tennessee Valley Authority	5	4	3	2	2	10	8	8	11	11	0						
All other agencies	6	5	5	6	6	11	13	15	15	14	14						

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
APPLIED RESEARCH											
Total, all agencies	10,854	10,695	11,369	11,091	12,137	12,001	13,150	13,226	13,641	12,803	12,791
Dept. of Agriculture	571	588	579	582	636	666	620	682	655	623	601
Dept. of Commerce	377	363	360	371	427	561	531	646	793	782	735
Dept. of Defense	2,943	2,753	3,029	2,770	2,802	2,975	3,426	2,895	2,853	2,556	2,405
Dept. of Education	125	124	131	134	127	120	125	125	123	126	124
Dept. of Energy	1,242	1,224	1,142	1,143	1,633	1,676	1,643	1,599	1,697	1,220	1,365
Dept. of Health & Human Services	2,647	2,815	3,021	3,024	3,202	2,887	3,407	3,669	3,731	3,709	3,729
Dept. of the Interior	298	310	283	289	333	340	341	540	444	439	433
Dept. of Justice	14	11	12	12	15	15	20	19	16	17	20
Dept. of Transportation	83	106	135	128	118	156	219	258	301	262	301
Dept. of the Treasury	15	13	15	16	21	17	4	9	45	46	48
Dept. of Veterans Affairs	209	208	220	214	183	185	189	199	192	217	197
Environmental Protection Agency	297	281	249	259	269	294	265	287	308	260	297
Agency for International Development	182	154	242	322	362	294	342	204	251	204	149
National Aeronautics & Space Administration	1,514	1,421	1,635	1,528	1,714	1,491	1,704	1,787	1,922	2,064	2,086
National Science Foundation	120	116	121	111	112	127	135	162	164	158	168
Nuclear Regulatory Commission	148	126	128	117	112	119	117	86	82	54	52
Smithsonian Institution	0	0	0	0	0	0	0	0	0	0	0
Tennessee Valley Authority	17	18	13	18	17	22	18	16	16	18	13
All other agencies	52	62	55	52	54	56	44	43	48	50	68
DEVELOPMENT											
Total, all agencies	45,010	44,428	45,460	44,997	38,402	41,102	39,399	37,919	37,343	36,784	34,447
Dept. of Agriculture	35	37	40	51	63	66	74	74	75	73	73
Dept. of Commerce	77	54	52	66	41	55	72	103	226	249	201
Dept. of Defense	38,461	37,307	37,943	36,201	29,235	32,056	30,278	28,861	27,907	27,553	25,778
Dept. of Education	31	35	42	43	41	42	43	38	37	36	40
Dept. of Energy	3,208	3,265	3,088	3,283	2,788	2,760	2,750	2,634	2,495	2,158	2,055
Dept. of Health & Human Services	705	771	911	1,007	1,639	1,042	1,127	1,224	1,282	1,262	1,255
Dept. of the Interior	26	28	30	36	41	39	38	42	27	23	24
Dept. of Justice	27	30	23	22	29	28	23	18	30	49	52
Dept. of Transportation	309	249	205	265	273	288	311	331	331	279	276
Dept. of the Treasury	11	12	10	7	7	4	5	9	12	12	9
Dept. of Veterans Affairs	23	22	23	24	23	23	28	23	18	20	19
Environmental Protection Agency	86	93	120	112	82	80	130	144	139	95	151
Agency for International Development	77	81	67	31	21	66	22	36	28	18	12
National Aeronautics & Space Administration	1,831	2,330	2,813	3,726	4,022	4,428	4,358	4,244	4,618	4,843	4,396
National Science Foundation	0	0	0	0	0	0	0	0	0	0	0
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0
Smithsonian Institution	0	0	0	0	0	0	0	0	0	0	0
Tennessee Valley Authority	73	80	54	46	51	73	79	68	62	66	56
All other agencies	31	36	38	77	47	53	59	71	57	46	49

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
R&D PLANT											
Total, all agencies	2,227	2,398	2,422	2,437	2,935	2,985	3,022	2,068	2,097	1,790	1,847
Dept. of Agriculture	135	158	100	110	149	165	139	120	133	136	111
Dept. of Commerce	6	13	10	17	16	21	25	30	72	72	93
Dept. of Defense	576	508	559	523	438	397	362	211	61	77	35
Dept. of Education	25	6	2	10	4	2	2	2	0	0	0
Dept. of Energy	931	1,066	977	983	1,255	1,321	1,424	868	692	686	732
Dept. of Health & Human Services	44	23	88	116	89	97	146	114	238	276	380
Dept. of the Interior	14	11	12	15	23	18	23	9	6	2	6
Dept. of Justice	13	0	0	0	0	0	0	0	0	0	0
Dept. of Transportation	14	16	17	23	19	25	31	39	27	26	20
Dept. of the Treasury	0	0	0	0	0	0	0	0	0	0	0
Dept. of Veterans Affairs	7	23	12	4	3	6	3	11	7	3	4
Environmental Protection Agency	0	0	0	0	0	0	2	5	4	4	4
Agency for International Development	8	7	0	0	0	0	0	0	0	0	0
National Aeronautics & Space Administration	373	499	581	565	744	818	730	491	581	302	279
National Science Foundation	74	66	60	42	164	102	127	164	269	199	177
Nuclear Regulatory Commission	0	0	0	0	0	0	0	0	0	0	0
Smithsonian Institution	3	1	4	5	2	4	5	5	5	5	4
Tennessee Valley Authority	0	0	0	0	5	5	3	1	1	1	0
All other agencies	1	0	0	20	23	7	1	0	0	0	0
R&D AND R&D PLANT											
Total, all agencies	68,878	68,562	71,109	70,634	65,996	68,577	68,630	66,121	65,996	64,530	62,133
Dept. of Agriculture	1,278	1,342	1,261	1,299	1,421	1,492	1,433	1,453	1,416	1,364	1,323
Dept. of Commerce	492	466	455	487	520	672	664	816	1,128	1,138	1,064
Dept. of Defense	43,074	41,590	42,591	40,510	33,498	36,526	35,303	33,131	31,996	31,216	29,233
Dept. of Education	185	170	180	192	180	171	175	170	167	165	167
Dept. of Energy	6,670	6,936	6,785	7,024	7,411	7,493	7,528	6,628	6,403	5,842	5,953
Dept. of Health & Human Services	8,013	8,366	8,928	9,135	10,126	9,085	10,232	10,611	10,884	11,097	11,173
Dept. of the Interior	501	497	537	561	633	628	626	670	528	515	514
Dept. of Justice	65	50	43	43	50	48	48	43	54	73	83
Dept. of Transportation	406	371	357	417	410	470	563	630	702	609	645
Dept. of the Treasury	33	31	29	28	32	25	16	18	57	58	57
Dept. of Veterans Affairs	260	274	275	259	226	230	233	247	228	254	232
Environmental Protection Agency	420	405	425	450	445	484	485	532	517	420	519
Agency for International Development	271	245	312	359	389	366	373	242	281	224	165
National Aeronautics & Space Administration	4,941	5,546	6,614	7,575	8,234	8,475	8,547	8,392	8,959	9,034	8,431

Appendix table 4-27.
Federal obligations for R&D and R&D plant, by agency and character of work: FYs 1987-97

Agency	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
National Science Foundation	1,848	1,853	1,928	1,855	2,001	1,970	1,961	2,107	2,267	2,144	2,196
Nuclear Regulatory Commission	148	126	128	117	112	119	117	86	82	54	52
Smithsonian Institution	90	88	94	95	102	102	104	123	120	118	126
Tennessee Valley Authority	94	102	70	75	75	101	107	93	87	95	68
All other agencies	90	103	97	154	130	122	114	128	121	111	131

NOTE: See appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1956-1996*, NSF 96-320 (Arlington, VA: 1996); and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, *Detailed Statistical Tables*, NSF 97-327 (Arlington, VA: 1997).

See figures 4-13 and 4-14 and text table 4-7.

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Science & Engineering Indicators - 1998

Appendix table 4-28.

Department of Defense basic research funding: FYs 1996-2001
 (Millions of dollars)

	1996	1997	1998	1999	2000	2001
Total Department of Defense	1,126	1,156	1,218	1,270	1,317	1,361
Total, services	787	825	858	897	934	970
Army	186	204	215	224	236	246
In-house laboratory independent research	14	15	16	17	18	19
Defense research sciences	125	142	147	153	162	167
University and industry research centers	47	47	52	54	57	60
Navy	377	387	403	428	449	470
In-house laboratory independent research	15	15	17	17	17	18
Defense research sciences	362	372	386	411	432	452
Air Force (Defense research sciences)	224	234	240	245	249	254
Total, Defense agencies	339	331	360	373	383	391
Chemical and biological defense programs	27	29	26	27	28	29
Office of the Secretary of Defense	234	227	259	270	277	285
In-house laboratory independent research	3	2	1	1	0	0
University research initiatives	222	209	237	247	255	262
Focused research initiatives	9	16	21	22	22	23
Advanced Research Projects Agency (Defense research sciences)	78	75	75	76	78	77

SOURCE: Department of Defense, *Basic Research Plan* (Washington, DC: 1996).

Appendix table 4-29.
Estimated federal obligations for R&D, by selected agency, performer, and character of work: FY 1997
 (Millions of current dollars)

Agency	Total	Federal intramural	Industrial firms	FFRDCs administered by industry	Universities and colleges	FFRDCs administered by U&C	Other nonprofit	FFRDCs administered by nonprofits	State and local govt.	Foreign
Total R&D										
Total, all agencies	68,064	16,404	30,713	1,340	12,362	3,231	2,884	644	282	206
Dept. of Agriculture	1,369	922	12	0	71	0	7	0	2	4
Dept. of Commerce	1,096	712	303	0	* 1,288	203	351	0	3	1
Dept. of Defense	32,964	7,919	22,625	155	574	2,035	69	363	0	61
Dept. of Energy	5,895	507	1,516	933	574	2,035	69	233	14	14
Dept. of Health & Human Services	12,185	2,362	557	227	7,088	21	1,734	21	129	46
Dept. of the Interior	574	508	16	*	48	*	*	0	*	1
Environmental Protection Agency	706	239	264	2	67	9	27	7	91	*
National Aeronautics & Space Admin	581	237	158	0	132	0	43	0	7	4
National Science Foundation	9,204	2,301	5,063	0	708	804	275	4	3	47
All other agencies	2,279	19	125	*	1,824	145	156	1	5	5
All other agencies	1,212	677	75	24	142	13	216	16	27	23
Basic research										
Total, all agencies	14,732	2,668	1,279	368	7,405	1,520	1,270	83	92	47
Dept. of Agriculture	608	395	7	0	199	0	4	0	1	2
Dept. of Commerce	39	34	1	0	4	*	*	0	0	0
Dept. of Defense	1,146	293	153	1	647	4	39	*	0	9
Dept. of Energy	2,035	69	103	241	440	1,096	14	70	2	1
Dept. of Health & Human Services	6,558	1,142	270	126	3,928	17	973	11	64	27
Dept. of the Interior	57	51	0	0	6	0	*	0	0	0
Dept. of Transportation	54	*	20	*	1	*	12	0	21	0
Environmental Protection Agency	75	31	20	0	17	0	6	0	1	*
National Aeronautics & Space Admin	1,885	471	614	0	480	257	56	1	1	3
National Science Foundation	2,090	18	90	*	1,680	145	149	*	3	4
All other agencies	186	164	0	0	4	0	17	1	1	1
Applied research										
Total, all agencies	14,441	5,028	3,521	637	3,418	611	930	109	115	73
Dept. of Agriculture	678	449	6	0	218	0	3	0	1	2
Dept. of Commerce	830	605	152	0	64	*	4	0	3	1
Dept. of Defense	2,716	1,073	1,192	8	321	65	39	14	0	5
Dept. of Energy	1,541	183	1,73	529	93	439	36	69	6	13
Dept. of Health & Human Services	4,210	1,047	222	76	2,204	3	579	9	56	14
Dept. of the Interior	489	441	6	*	41	*	*	0	*	1
Dept. of Transportation	340	148	110	1	29	2	14	1	36	*
Environmental Protection Agency	335	137	91	0	76	0	25	0	4	2
National Aeronautics & Space Admin	2,356	589	1,485	0	107	90	71	1	1	12
National Science Foundation	189	1	34	0	144	*	6	0	2	2
All other agencies	757	356	50	23	120	13	153	16	6	22

Appendix table 4-29.
Estimated federal obligations for R&D, by selected agency, performer, and character of work: FY 1997
(Millions of current dollars)

Agency	Total	Federal intramural	Industrial firms	Development			FFRDCs administered by U&C	Universities and colleges	FFRDCs administered by U&C	Other nonprofit	FFRDCs administered by nonprofits	State and local govt.	Foreign
				Federal	Intramural	FFRDCs administered by industry							
Total, all agencies	38,890	8,708	25,913	334	1,539	1,099	684	453	75	*	*	87	*
Dept. of Agriculture	82	78	0	0	4	0	0	0	1	0	0	0	1
Dept. of Commerce	227	73	150	0	3	0	1	0	0	0	0	0	48
Dept. of Defense	29,103	6,553	21,280	146	320	134	274	349	0	0	0	0	*
Dept. of Energy	2,320	255	1,240	163	41	501	19	94	6	6	6	6	*
Dept. of Health & Human Services	1,417	173	65	25	955	1	182	1	10	10	10	10	4
Dept. of the Interior	27	16	10	0	1	0	0	0	0	0	0	0	0
Dept. of Transportation	311	91	134	1	37	6	1	6	6	35	35	35	*
Environmental Protection Agency	170	69	46	0	39	0	13	0	2	2	2	2	1
National Aeronautics & Space Admin	4,964	1,241	2,963	0	120	457	147	2	1	1	1	1	32
National Science Foundation	0	0	0	0	0	0	0	0	0	0	0	0	0
All other agencies	268	157	25	0	19	0	47	0	0	0	0	0	1

* = less than \$50,000; FFRDCs = federally funded research and development centers; U&C = universities and colleges

NOTES: These figures reflect funding levels as reported by federal agencies in March through October 1996.

SOURCE: National Science Foundation, Science Resources Studies Division, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA, 1997).

See text table 4-6.

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Appendix table 4-30.
Federal obligations for R&D, by character of work and performer: FYs 1987-97

Character of work and performer	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996(est.)	1997(est.)
Millions of current dollars											
Total R&D	55,253	56,769	61,406	63,667	61,295	65,592	67,314	67,256	68,755	69,077	68,064
Federal intramural ^a	13,413	14,115	15,121	16,002	15,238	15,690	16,556	16,139	17,343	16,897	16,404
Industrial firms excluding FFRDCS	26,768	26,719	28,548	29,378	26,421	29,745	30,326	30,454	30,469	31,268	30,713
FFRDCs administered by industry	1,860	1,911	1,960	2,237	2,068	2,010	1,451	1,294	1,204	1,231	1,340
Universities and colleges excluding FFRDCS	7,337	7,828	8,672	9,142	10,169	10,271	11,156	11,829	11,933	12,251	12,362
FFRDCs administered by universities	3,210	3,474	3,497	3,466	3,604	3,856	3,666	3,293	3,574	3,302	3,231
Nonprofit institutions excluding FFRDCS	1,711	1,683	1,999	2,249	2,637	2,804	2,811	2,930	2,807	2,867	2,884
FFRDCs administered by nonprofit institutions	511	506	522	632	679	746	753	736	831	721	644
State and local government	148	142	167	214	215	184	320	325	317	274	282
Foreign	296	392	919	345	264	288	272	257	278	266	206
Basic research	8,942	9,474	10,602	11,286	12,171	12,490	13,399	13,553	13,895	14,482	14,732
Federal intramural ^a	2,046	2,050	2,371	2,366	2,447	2,397	2,605	2,505	2,713	2,414	2,668
Industrial firms excluding FFRDCS	467	597	773	888	950	920	959	1,109	1,221	1,226	1,279
FFRDCs administered by industry	120	133	167	175	209	188	237	238	239	340	368
Universities and colleges excluding FFRDCS	4,666	4,868	5,221	5,548	6,065	6,332	6,799	7,024	6,951	7,754	7,405
FFRDCs administered by universities	907	990	1,098	1,228	1,306	1,394	1,438	1,336	1,438	1,504	1,520
Nonprofit institutions excluding FFRDCS	658	729	839	924	1,016	1,097	1,165	1,126	1,134	1,062	1,270
FFRDCs administered by nonprofit institutions	13	18	42	59	81	65	71	74	75	72	83
State and local government	38	43	44	50	49	42	72	75	79	70	92
Foreign	29	46	47	48	49	54	53	66	45	41	47
Applied research	8,998	9,176	10,163	10,453	11,798	12,001	13,491	13,887	14,678	14,096	14,441
Federal intramural ^a	3,392	3,288	3,611	3,587	4,093	4,219	4,755	4,983	5,075	4,990	5,028
Industrial firms excluding FFRDCS	1,982	2,046	2,102	2,312	2,457	2,531	3,060	2,954	3,507	3,447	3,521
FFRDCs administered by industry	314	322	353	367	416	405	559	500	579	538	637
Universities and colleges excluding FFRDCS	1,975	2,155	2,572	2,593	2,803	2,729	3,046	3,299	3,420	3,166	3,418
FFRDCs administered by universities	564	575	605	581	855	958	910	845	797	582	611
Nonprofit institutions excluding FFRDCS	550	571	681	738	910	952	876	969	922	1,039	930
FFRDCs administered by nonprofit institutions	77	65	67	89	90	74	102	104	135	112	109
State and local government	53	60	78	76	80	67	140	156	143	129	115
Foreign	93	94	95	109	94	66	44	77	100	93	73
Development	37,313	38,119	40,640	41,929	37,327	41,102	40,424	39,815	40,181	40,499	38,890
Federal intramural ^a	7,975	8,776	9,139	10,049	8,699	9,074	9,196	8,651	9,555	9,493	8,708
Industrial firms excluding FFRDCS	24,320	24,077	25,673	26,178	23,014	26,294	26,307	26,391	25,741	26,595	25,913
FFRDCs administered by industry	1,426	1,456	1,440	1,695	1,444	1,417	655	556	386	354	334
Universities and colleges excluding FFRDCS	697	805	879	1,001	1,301	1,211	1,312	1,505	1,561	1,331	1,539
FFRDCs administered by universities	1,739	1,909	1,794	1,658	1,443	1,504	1,319	1,112	1,339	1,216	1,099
Nonprofit institutions excluding FFRDCS	503	383	480	587	712	754	771	835	750	766	684
FFRDCs administered by nonprofit institutions	421	423	412	484	509	606	580	558	621	538	453
State and local government	58	39	46	88	86	75	108	95	95	75	75
Foreign	173	251	777	188	121	168	175	113	133	132	87

Appendix table 4-30.
Federal obligations for R&D, by character of work and performer: FYs 1987-97

Character of work and performer	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996(est.)	1997(est.)
Millions of constant 1992 dollars											
Total R&D	66,650	66,164	68,687	68,312	63,061	65,592	65,608	64,053	63,899	62,740	60,287
Federal intramural ^a	16,180	16,451	16,914	17,170	15,677	15,690	16,136	15,371	16,118	15,347	14,529
Industrial firms excluding FFRDCS	32,290	31,141	31,933	31,521	27,182	29,745	29,558	29,004	28,317	28,399	27,203
FFRDCs administered by industry	2,244	2,227	2,192	2,400	2,128	2,010	1,414	1,232	1,119	1,118	1,186
Universities and colleges excluding FFRDCS	8,850	9,124	9,700	9,809	10,462	10,271	10,873	11,265	11,090	11,127	10,950
FFRDCs administered by universities	3,872	4,049	3,912	3,719	3,708	3,856	3,573	3,136	3,322	2,999	2,861
Nonprofit institutions excluding FFRDCS	2,064	1,962	2,236	2,413	2,713	2,804	2,740	2,790	2,608	2,604	2,554
FFRDCs administered by nonprofit institutions	616	590	584	678	699	746	734	700	773	655	571
State and local government	179	166	187	230	221	184	312	310	294	249	249
Foreign	357	457	1,028	370	272	288	265	244	258	242	182
Basic research	10,786	11,042	11,859	12,109	12,522	12,490	13,059	12,907	12,914	13,154	13,049
Federal intramural ^a	2,468	2,389	2,652	2,539	2,517	2,397	2,539	2,386	2,521	2,192	2,363
Industrial firms excluding FFRDCS	563	696	865	953	977	920	935	1,056	1,135	1,113	1,133
FFRDCs administered by industry	145	155	187	188	215	188	231	226	222	309	326
Universities and colleges excluding FFRDCS	5,628	5,674	5,840	5,953	6,240	6,332	6,627	6,690	6,460	7,042	6,559
FFRDCs administered by universities	1,094	1,154	1,228	1,318	1,344	1,394	1,402	1,272	1,337	1,366	1,346
Nonprofit institutions excluding FFRDCS	793	850	938	991	1,045	1,097	1,135	1,072	1,054	965	1,125
FFRDCs administered by nonprofit institutions	16	21	47	63	83	65	69	70	70	65	73
State and local government	45	50	49	54	50	42	50	54	52	73	82
Foreign	35	54	53	52	50	54	52	54	52	41	41
Applied research	10,854	10,695	11,368	11,216	12,138	12,001	13,149	13,226	13,641	12,803	12,791
Federal intramural ^a	4,091	3,832	4,039	3,849	4,211	4,219	4,635	4,746	4,716	4,533	4,454
Industrial firms excluding FFRDCS	2,391	2,385	2,351	2,481	2,528	2,531	2,982	2,814	3,259	3,131	3,118
FFRDCs administered by industry	378	375	395	394	428	405	545	476	538	488	564
Universities and colleges excluding FFRDCS	2,382	2,512	2,877	2,782	2,884	2,729	2,969	3,142	3,179	2,876	3,027
FFRDCs administered by universities	681	670	677	623	880	958	887	805	741	529	542
Nonprofit institutions excluding FFRDCS	663	666	762	792	936	952	854	923	857	944	823
FFRDCs administered by nonprofit institutions	92	76	75	95	93	74	99	99	125	102	96
State and local government	64	70	87	82	82	67	136	148	133	117	102
Foreign	112	110	106	117	97	66	43	74	93	84	64
Development	45,009	44,428	45,459	44,988	38,402	41,102	39,400	37,919	37,343	36,784	34,447
Federal intramural ^a	9,620	10,228	10,223	10,782	8,950	9,074	8,963	8,239	8,880	8,622	7,713
Industrial firms excluding FFRDCS	29,337	28,062	28,717	28,088	23,677	26,294	25,640	25,134	23,923	24,155	22,952
FFRDCs administered by industry	1,721	1,697	1,611	1,819	1,486	1,417	638	530	359	321	296
Universities and colleges excluding FFRDCS	841	938	983	1,074	1,338	1,211	1,279	1,434	1,451	1,209	1,363
FFRDCs administered by universities	2,097	2,225	2,007	1,779	1,485	1,504	1,286	1,059	1,244	1,105	974
Nonprofit institutions excluding FFRDCS	607	446	537	630	733	754	751	795	697	695	606
FFRDCs administered by nonprofit institutions	508	493	461	519	524	606	565	531	577	488	401
State and local government	70	45	51	94	88	75	105	90	88	68	66
Foreign	209	293	869	202	124	168	171	108	124	120	77

Appendix table 4-30.
Federal obligations for R&D, by character of work and performer: FYs 1987-97

FFRDCs = federally funded research and development centers

NOTE: See appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

^aFederal intramural activities cover costs associated with the planning and administration of intramural and extramural programs by federal personnel and actual intramural performance.
SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1956-1996*, NSF 96-320 (Arlington, VA: 1996); and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA: 1997).
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Appendix table 4-31.
Federal R&D obligations for federal intramural performance, by selected agency: FYs 1980-97
 (Millions of current dollars)

	All agencies	Defense	Energy	NASA	HHS	USDA	Commerce	Interior	All other agencies
1980	7,632	3,796	474	965	820	457	226	242	653
1981	8,426	4,281	451	1,044	872	511	237	274	756
1982	9,141	5,139	176	1,166	946	531	242	261	680
1983	10,582	6,401	258	1,134	1,034	559	252	274	670
1984	11,572	7,257	216	1,043	1,066	589	256	334	811
1985	12,945	8,324	224	1,171	1,147	628	280	342	830
1986	13,535	8,881	206	1,217	1,236	630	285	332	749
1987	13,413	8,336	248	1,414	1,293	649	320	355	799
1988	14,115	8,880	245	1,335	1,408	694	316	353	883
1989	15,121	9,295	248	1,733	1,529	689	325	394	907
1990	16,003	9,639	307	1,968	1,662	737	336	424	929
1991	15,238	8,157	381	2,112	1,975	824	400	490	900
1992	15,690	8,601	336	2,210	1,783	862	512	513	872
1993	16,556	8,742	517	2,295	2,033	868	500	522	1,080
1994	16,139	8,017	562	2,271	2,206	931	597	595	959
1995	17,343	8,907	491	2,254	2,485	915	665	492	1,135
1996 (est.)	16,897	8,655	416	2,403	2,240	898	688	493	1,104
1997 (est.)	16,404	7,919	507	2,301	2,362	922	712	508	1,172

HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; USDA = Department of Agriculture

NOTE: Intramural activities cover costs associated with the planning and administration of intramural and extramural R&D programs by federal personnel and actual intramural R&D performance.

SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1956-1996*, NSF 96-320 (Arlington, VA: 1996); and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA: 1997).

See text table 4-7.

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Appendix table 4-32.

Federal R&D laboratory campuses, by agency and state: FY 1995

Federal agency	Number of laboratory campuses	1995 (millions)	State	Number of laboratory campuses	1995 (millions)
Total	515	26,578.8	Total	515	26,578.8
Department of Agriculture	185	733.4	Alabama	11	992.3
Agricultural Research Service	107	556.1	Alaska	10	33.8
Forest Service	78	177.3	Arizona	8	125.2
Department of Commerce	38	430.3	Arkansas	7	32.1
Nat. Inst. of Standards & Tech.	2	199.9	California	46	4,119.7
Nat. Oceanic & Atmos. Admin.	36	230.4	Colorado	13	575.3
Department of Defense	68	9,150.8	Connecticut	5	18.6
Dept. of the Air Force	11	1,824.0	Delaware	1	1.0
Dept. of the Army	29	2,076.3	Florida	21	848.6
Dept. of the Navy	21	4,668.2	Georgia	14	132.8
Other Defense agencies	7	582.3	Hawaii	6	21.2
Department of Education	10	41.0	Idaho	8	816.9
Department of Energy	33	8,080.7	Illinois	15	727.7
Defense Programs	3	3,203.3	Indiana	3	11.3
Energy research	16	2,670.6	Iowa	4	64.8
Energy efficiency & renewable	1	237.6	Kansas	3	6.8
Environmental management	3	904.0	Kentucky	2	2.6
Fossil energy	6	445.7	Louisiana	8	39.8
Naval reactors	2	585.0	Maine	1	0.4
Nonproliferation	1	5.0	Maryland	25	2,921.2
Office of the Sec. of Energy	1	29.5	Massachusetts	15	1,005.3
Dept. of Health & Human Services	19	1,371.4	Michigan	8	101.8
Centers for Disease Ctrl. & Prev.	6	108.6	Minnesota	7	33.9
Food and Drug Administration ^a	3	40.2	Mississippi	13	285.1
National Institutes of Health	10	1,222.6	Missouri	8	71.4
Department of the Interior	20	547.4	Montana	6	21.0
Bureau of Reclamation	1	71.3	Nebraska	4	19.9
National Biological Service	16	105.1	Nevada	3	28.4
U.S. Geological Survey	3	371.0	New Hampshire	3	31.4
Department of Justice—DEA	2	1.0	New Jersey	8	592.1
Department of Transportation	6	536.2	New Mexico	9	2,692.5
Federal Aviation Administration	3	211.7	New York	19	680.1
Federal Highway Admin.	1	125.5	North Carolina	13	240.4
Nat. Highway Traf. Safety Admin.	1	0.8	North Dakota	5	24.6
Research & Spec Prog Admin.	1	198.2	Ohio	12	705.2
Department of the Treasury—IRS	1	1.5	Oklahoma	10	142.3
Department of Veterans Affairs	102	270.0	Oregon	14	83.3
Environ. Protection Agency (R&D)	11	348.2	Pennsylvania	14	578.7
Nat. Aeronautics & Space Admin.	10	4,832.7	Rhode Island	5	416.3
Aeronautics	4	1,369.7	South Carolina	10	122.2
Mission to Planet Earth	1	646.5	South Dakota	2	2.2
Space flight	4	2,032.8	Tennessee	8	844.9
Space science	1	783.7	Texas	22	910.6
National Science Foundation	5	173.4	Utah	7	75.2
Nuclear Regulatory Commission	1	16.0	Vermont	2	3.8
Smithsonian Institution	2	17.5	Virginia	19	3,964.4
Tennessee Valley Authority	2	27.3	Washington	19	617.9
			West Virginia	9	228.0
			Wisconsin	9	42.0
			Wyoming	3	4.7
			Washington, D.C.	9	487.3
			Puerto Rico	4	15.8
			Foreign countries ^b	5	14.0

DEA = Drug Enforcement Administration; IRS = Internal Revenue Service

NOTES: Data for the Department of Defense and the National Aeronautics and Space Administration are from their FY 1994 operating budgets; data for the Department of Education are from its FY 1996 operating budget.

^aData for the Food and Drug Administration exclude product testing activities.^bThe Agricultural Research Service has R&D laboratories in Argentina, France, and Panama. The Navy has medical labs in Egypt and Indonesia.SOURCE: U.S. General Accounting Office, *Federal R&D Laboratories*, GAO/RCED/NSIAD-96-78R (Washington, DC: 1996).

Appendix table 4-33.

Federal R&D obligations to FFRDCs, by administering sector and selected agency: FYs 1987-97
(Millions of current dollars)

	All agencies	Defense	Energy	NASA	All other agencies
Total					
1987	5,580	1,462	3,410	476	233
1988	5,891	1,541	3,572	560	217
1989	6,075	1,386	3,728	633	328
1990	6,425	1,494	3,895	622	415
1991	6,451	1,396	3,948	738	369
1992	6,718	1,537	3,996	793	392
1993	5,871	1,239	3,521	688	424
1994	5,322	856	3,310	778	378
1995	5,610	823	3,296	1,048	443
1996 (est.)	5,255	749	3,131	907	468
1997 (est.)	5,214	721	3,201	808	485
FFRDCs administered by industry					
1987	1,860	325	1,475	0	61
1988	1,911	316	1,536	0	60
1989	2,056	309	1,588	0	160
1990	2,327	419	1,718	0	190
1991	2,168	316	1,690	0	162
1992	2,117	335	1,607	0	175
1993	1,451	202	1,094	0	156
1994	1,294	116	1,011	0	167
1995	1,204	93	936	0	175
1996 (est.)	1,231	76	905	0	250
1997 (est.)	1,340	155	933	0	252
FFRDCs administered by universities and colleges					
1987	3,210	737	1,839	475	158
1988	3,474	829	1,945	560	141
1989	3,497	686	2,033	630	148
1990	3,466	658	2,020	619	168
1991	3,604	637	2,072	736	159
1992	3,856	668	2,227	791	169
1993	3,667	545	2,205	685	232
1994	3,293	275	2,077	771	170
1995	3,574	262	2,057	1,044	212
1996 (est.)	3,302	223	2,002	903	174
1997 (est.)	3,231	203	2,035	804	189
FFRDCs administered by other nonprofit institutions					
1987	511	400	96	1	14
1988	506	397	91	1	16
1989	522	391	107	3	20
1990	632	416	157	2	57
1991	679	442	186	2	49
1992	746	534	163	2	47
1993	753	492	222	2	37
1994	736	466	222	7	41
1995	831	468	303	4	57
1996 (est.)	721	449	224	4	44
1997 (est.)	644	363	233	4	45

FFRDCs = federally funded research and development centers; NASA = National Aeronautics and Space Administration

SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1956-1996*, NSF 96-320 (Arlington, VA: 1996); NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997, Detailed Statistical Tables*, NSF 97-327 (Arlington, VA: 1997); and unpublished tabulations.

See text table 4-7.

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Appendix table 4-34.
Federal obligations for R&D to federally funded research and development centers, by individual FFRDC and agency: FY 1995
 (Thousands of dollars)

FFRDC	Total	Commerce	Defense	Energy	HHS	NASA	NSF	Other agencies
TOTAL, ALL FFRDCs								
FFRDCs administered by industrial firms								
Energy Technology Engineering Center	1,203,899	0	93,468	935,637	142,164	0	10	32,620
Idaho National Engineering Laboratory	11,783	0	48	11,526	0	0	0	209
NCI Frederick Cancer R&D Center	77,745	0	1,578	63,753	0	0	0	12,414
Oak Ridge National Laboratory	141,707	0	72	0	141,635	0	0	0
Sandia National Laboratories	288,332	0	9,086	267,663	529	0	0	11,044
Savannah River Technology Center	654,472	0	82,659	562,860	0	0	0	8,953
3,574,349	0	25	29,835	0	0	0	0	0
FFRDCs administered by universities & colleges								
Ames Laboratory	29,815	0	30	25,930	0	0	0	3,855
Argonne National Laboratory	252,879	4	1,841	246,877	0	240	0	3,917
Brookhaven National Laboratory	216,094	50	2,696	199,269	2,806	353	1,448	9,472
Ernest Orlando Lawrence Berkeley National Laboratory	170,970	75	879	156,754	12,343	703	116	0
Fermi National Accelerator Laboratory	170,917	0	0	170,917	0	0	0	0
Jet Propulsion Laboratory	1,056,916	0	25,778	0	0	1,031,078	60	0
Lawrence Livermore National Laboratory	500,622	0	32,857	461,840	3,192	1,016	2	1,715
Lincoln Laboratory	158,648	0	150,206	0	0	343	0	8,099
Los Alamos National Laboratory	540,637	0	24,781	489,485	5,537	812	1162	18,860
National Astronomy & Ionosphere Center	7,669	0	0	0	0	0	7,669	0
National Center for Atmospheric Research	79,483	0	462	0	0	7,449	71,572	0
National Optical Astronomy Observatories	29,099	0	0	0	0	0	29,099	0
National Radio Astronomy Observatory	29,960	0	0	0	363	0	29,597	0
Oak Ridge Institute for Science & Education	16,747	0	25	14,330	237	1,919	52	184
Princeton Plasma Physics Laboratory	115,284	0	0	115,178	0	0	106	0
Software Engineering Institute	21,965	0	21,965	0	0	0	0	0
Stanford Linear Accelerator Center	117,713	0	0	117,713	0	0	0	0
Thomas Jefferson National Accelerator Facility	59,031	0	0	59,031	0	0	0	0
FFRDCs administered by other nonprofit institutions								
137,495	0	468,118	302,929	19,415	3,771	583	36,577	0
Aerospace FFRDC	137,495	0	136,552	0	0	738	205	0
Arroyo Center	2,621	0	2,621	0	0	0	0	0
C3I Federally Funded Research & Development Center	192,993	0	190,330	0	0	2,549	114	0
Center for Advanced Aviation System Development	15,961	0	7,073	0	0	0	0	8,888
Center for Naval Analyses	44,143	0	44,056	0	0	0	87	0
Center for Nuclear Waste Regulatory Analyses	5,795	0	0	0	0	0	0	5,795
Critical Technologies Institute	600	0	600	0	0	0	0	0
Inhalation Toxicology Research Institution	7,417	0	6,648	769	0	0	0	0
Institute for Defense Analyses Studies & Analyses FFRDC	56,215	0	56,038	0	0	0	177	0
Logistics Management Institute	2,271	0	1,871	0	0	200	0	200

Appendix table 4-34.
Federal obligations for R&D to federally funded research and development centers, by individual FFRDC and agency: FY 1995
 (Thousands of dollars)

FFRDC	Total	Commerce	Defense	Energy	HHS	NASA	NSF	Other agencies
National Defense Research Institute	14,326	0	2,633	0	11,558	135	0	0
National Renewable Energy Laboratory	102,278	0	0	102,278	0	0	0	0
Pacific Northwest National Laboratory	208,529	0	2,944	194,003	7,088	0	0	4,494
Project Air Force	24,149	0	24,000	0	0	149	0	0
Tax Systems Modernization Institute	17,200	0	0	0	0	0	0	17,200

FFRDC = federally funded research and development center; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation
 SOURCE: National Science Foundation, Science Resources Studies Division, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA, 1997).

Appendix table 4-35.
Federal obligations for R&D to federally funded research and development centers, by individual FFRDC: FYs 1987-95
 (Thousands of dollars)

FFRDC	1987	1988	1989	1990	1991	1992	1993	1994	1995
TOTAL, ALL FFRDCs									
FFRDCs administered by industrial firms									
Bettis Atomic Power Laboratory ^a	5,580,231	5,890,825	6,075,331	6,398,286	6,451,491	6,610,876	5,871,234	5,321,939	5,609,641
Energy Technology Engineering Center	1,859,963	1,911,314	2,056,329	2,326,808	2,168,256	2,009,767	1,451,325	1,293,494	1,203,899
Hanford Engineering Development Laboratory	383,460	350,859	358,097	331,506	334,486	318,395	0	0	0
Idaho National Engineering Laboratory	20,284	14,746	10,470	9,364	16,270	13,231	14,288	1,010	11,783
Knolls Atomic Power Laboratory ^a	98,289	94,020	93,045	98,048	13,722	9,765	0	0	0
NCI Frederick Cancer R&D Center	117,743	104,112	120,067	173,209	175,143	134,220	68,452	85,853	77,745
Oak Ridge National Laboratory	245,258	291,615	311,642	290,513	317,818	361,461	0	0	0
Sandia National Laboratories	6,854	13,600	110,285	143,961	114,380	16,430	107,112	127,181	141,707
Savannah River Technology Center	236,553	249,570	277,707	422,146	292,433	291,305	319,357	288,824	288,332
Ames Laboratory	703,904	732,811	670,551	704,925	736,940	801,367	883,304	730,311	654,472
Argonne National Laboratory	47,618	59,981	104,465	153,136	167,064	63,593	58,812	60,315	29,860
Brookhaven National Laboratory	3,209,624	3,473,924	3,497,050	3,449,838	3,603,818	3,855,467	3,666,498	3,292,933	3,574,349
Ernest Orlando Lawrence Berkeley National Laboratory	15,812	17,657	17,588	19,527	26,906	24,808	256,434	27,792	29,815
Fermi National Accelerator Laboratory	187,063	200,871	211,732	249,181	254,080	256,434	273,859	258,533	252,879
Institute for Advanced Technology	180,802	195,112	214,837	202,992	222,755	217,953	212,759	218,792	216,094
Lincoln Laboratory	120,459	122,226	142,641	240,242	146,705	160,124	169,294	174,136	170,870
Los Alamos National Laboratory	136,650	145,475	160,462	157,947	158,883	166,220	168,117	168,684	170,917
Jet Propulsion Laboratory	0	0	0	1,579	2,548	7,078	13,873	0	0
Lawrence Livermore National Laboratory	483,964	678,811	771,362	698,709	797,629	963,504	741,535	785,880	1,056,916
National Optical Astronomy Observatory	877,401	905,311	779,275	652,888	815,470	802,136	705,261	526,388	500,622
National Radio Astronomy Observatory	261,262	223,643	207,930	210,322	199,104	190,266	291,842	136,058	158,648
Princeton Plasma Physics Laboratory	645,046	665,812	655,138	627,304	603,461	623,077	637,417	552,389	540,637
Stanford Linear Accelerator Center	5,814	6,752	6,187	7,337	6,051	7,347	7,766	10,035	7,669
Thomas Jefferson National Accelerator Facility	42,165	40,824	46,560	46,200	49,315	54,564	55,897	59,527	79,483
Aerospace FFRDC	0	0	0	0	0	0	0	0	0
C3I Federal Contract Research Center	192,651	234,259	227,152	163,641	183,220	156,896	188,068	189,967	192,993
Center for Advanced Aviation System Development	0	0	0	21,863	17,813	35,410	36,300	17,498	15,961
Center for Naval Analyses	34,316	34,990	34,694	38,046	48,121	42,493	45,464	46,733	44,143
Center for Nuclear Waste Regulatory Analyses	0	0	1,625	2,635	3,287	3,040	4,983	5,234	5,795
Critical Technologies Institute	0	0	0	0	0	0	600	0	0
Inhalation Toxicology Research Institute	0	0	8,210	7,704	7,524	7,516	8,052	7,341	7,417

Appendix table 4-35.
Federal obligations for R&D to federally funded research and development centers, by individual FFRDC: FYs 1987-95
 (Thousands of dollars)

FFRDC	1987	1988	1989	1990	1991	1992	1993	1994	1995
Institute for Defense Analyses Studies & Analyses FFRDC ...	27,691	33,326	41,124	54,828	44,229	49,378	48,575	46,731	56,215
Logistics Management Institute	1,608	2,013	1,145	36,328	3,341	2,045	3,928	3,122	2,271
National Defense Research Institute	17,152	15,819	21,427	7,375	25,849	23,634	8,396	17,833	14,326
National Renewable Energy Research Laboratory ^b	52,401	47,632	50,889	60,849	72,558	77,847	111,304	81,948	102,278
Pacific Northwest Laboratories	66,734	66,316	67,622	112,373	130,585	105,566	125,659	148,440	208,529
Project Air Force	20,299	0	232	95	22,400	0	1,685	24,000	24,149
Tax Systems Modernization Institute	0	0	0	0	0	0	2,155	2,155	17,200

FFRDC = federally funded research and development center

^aThe Department of Energy decertified Bettis Atomic Power Laboratory, Hanford Engineering Development Laboratory, and Knolls Atomic Power Laboratory as FFRDCs in October/November 1992.

^bIn September 1991, the name was changed from Solar Energy Research Institute.

SOURCES: National Science Foundation, Science Resources Studies Division, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA: 1997); and unpublished tabulations.

Appendix table 4-36.

Advanced Technology Program awards: 1990-96

	1990	1991	1992	1993	1994	1995	1996	Total
Number of awards	11	28	21	29	88	103	8	288
Single applicants	6	18	18	24	50	62	6	184
Joint ventures	5	10	3	5	38	41	2	104
Total participants ^a	35	83	32	50	211	318	12	741
Resubmittals	NA	3	7	6	4	17	2	39
Funding (\$ millions)	96	202	97	118	640	827	37	2,019
ATP share	46	93	48	60	309	414	19	989
To joint ventures	38	65	19	19	216	304	9	670
To single applicants	8	28	29	41	93	110	10	319
Industry share	52	109	49	58	331	413	18	1,030
From joint ventures	45	83	19	20	233	340	10	750
From single applicants	7	26	30	38	98	73	8	280

ATP = Advanced Technology Program

NOTE: Funding of each award is the total in a period of two to six years.

^aTotal participants include single applicants, joint venture leads, and joint venture participants. This category excludes subcontractors, informal collaborators with joint ventures, and collaborators and strategic partners of single applicants.

SOURCE: U.S. Department of Commerce, Advanced Technology Program, unpublished tabulations.

See figure 4-17.

Science & Engineering Indicators – 1998

Appendix table 4-37.
Small Business Innovation Research awards, by award type and agency: FYs 1983-95
 (Millions of current dollars)

Award type and agency	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Cumulative 1983-95
Total^a	45	108	199	298	351	389	432	461	483	508	698	718	865	5,555
By type														
Phase I awards	45	48	69	99	110	102	108	118	128	128	154	220	232	1,561
Phase II awards	0	60	130	199	241	285	322	342	336	371	491	474	602	3,853
By agency														
Defense	20	45	78	151	194	208	233	241	241	242	385	354	414	2,806
Health and Human Services	7	23	45	57	67	73	79	84	93	102	126	133	181	1,070
National Aeronautics and Space Administration	5	13	29	36	32	47	52	62	69	79	86	116	118	744
Energy	5	16	26	29	28	30	33	39	39	43	50	53	70	461
National Science Foundation	5	7	10	15	17	17	19	20	22	23	29	34	42	260
Agriculture	1	2	3	4	4	4	4	4	5	6	7	7	9	60
Transportation	*	2	3	4	3	3	4	4	4	6	3	4	7	53
Environmental Protection Agency	*	1	2	3	3	3	3	3	4	4	5	5	7	43
Education	*	1	1	2	2	2	2	2	2	3	3	3	3	26
Nuclear Regulatory Commission	*	1	1	1	1	1	1	1	1	0	1	2	1	13
Commerce	0	0	0	1	2	1	1	1	1	2	2	4	8	23
Interior	*	1	*	0	0	0	0	0	0	0	0	0	0	1

* = less than \$500,000

^aTotals are Small Business Innovation Research award obligations that include award modifications. The details by award type and agency do not necessarily contain subsequent year revisions and may not sum to totals.

SOURCE: U.S. Small Business Administration, *Small Business Innovation Development Act* (Washington, DC: annual series).

Appendix table 4-38.

Budgetary impact and company claims of the federal research and experimentation tax credit: FYs 1981-97
 (Millions of dollars)

	Credits claimed by U.S. firms (current \$) ^a	Outlay equivalent cost of credit (current \$) ^b	Total federal R&D outlays	Ratio of credit outlays to R&D (%)	Credits claimed by U.S. firms (constant \$) ^a	Outlay equivalent cost of credit (constant \$) ^b
1981	639	205	32,459	0.63	981	315
1982	839	640	34,391	1.86	1,203	917
1983	1,278	1,010	36,659	2.76	1,751	1,384
1984	1,589	3,360	39,691	8.47	2,097	4,434
1985	1,628	2,430	44,171	5.50	2,076	3,099
1986	1,292	2,295	50,609	4.53	1,603	2,847
1987	1,053	2,715	51,612	5.26	1,270	3,274
1988	1,277	1,240	54,739	2.27	1,488	1,445
1989	1,341	1,590	59,450	2.67	1,499	1,778
1990	1,547	1,625	62,135	2.62	1,660	1,744
1991	1,585	1,070	61,130	1.75	1,631	1,101
1992	1,578	1,850	62,934	2.94	1,578	1,850
1993	NA	1,900	65,241	2.91	NA	1,851
1994	NA	2,110	66,159	3.19	NA	2,009
1995	NA	1,820	66,375	2.74	NA	1,691
1996	NA	1,245	66,877	1.86	NA	1,131
1997	NA	1,055	67,692	1.56	NA	934

NA = not available

NOTES: Tax expenditure estimates are prepared by the U.S. Treasury Department, based on the income tax law enacted as of December 31 of the year for which the expenditures are reported. Expenditures for the years 1996-97 are estimated based on the income tax law enacted as of December 31, 1996. See appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

^aThe value of credits actually received by U.S. firms is less than the amounts claimed.

^b“Outlay equivalent” estimates are comparable to taxable outlay figures reported in the budget. This allows for a comparison of the resource cost of the tax credit with the cost of direct federal R&D expenditure support.

SOURCES: U.S. Office of Management and Budget, *Budget of the United States Government* (Washington, DC: U.S. Government Printing Office, annual series); and U.S. Internal Revenue Service, as reported in Office of Technology Assessment, *The Effectiveness of Research and Experimentation Tax Credits*, OTA-8P-ITC-174 (Washington, DC: U.S. Government Printing Office, 1995).

See figure 4-30.

Science & Engineering Indicators – 1998

Appendix table 4-39.
Federal R&D funding, by budget function: FYs 1980, 1985, and 1990-98

Function	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Millions of current dollars											
Total	29,739	49,887	63,781	65,898	68,398	69,884	68,331	68,791	69,049	70,988	71,602
National defense	14,946	33,698	39,925	39,328	40,083	41,249	37,764	37,204	37,801	39,030	38,726
Nondefense	14,793	16,189	23,856	26,570	28,315	28,635	30,567	31,587	31,249	31,958	32,876
Health	5,418	8,308	9,226	10,055	10,280	10,993	11,407	11,867	12,693	12,998	12,998
Space research and technology	2,738	2,725	5,765	6,511	6,744	6,988	7,414	7,916	7,844	7,795	8,004
General science	1,233	1,862	2,410	2,635	2,659	2,691	2,712	2,794	2,846	2,962	3,086
Energy	3,603	2,389	2,726	2,953	3,153	2,677	2,873	2,844	2,521	2,259	2,229
Natural resources and environment	999	1,059	1,386	1,582	1,688	1,802	1,865	1,988	1,802	1,842	1,902
Transportation	887	1,030	1,045	1,231	1,523	1,703	1,888	1,833	1,795	1,827	1,939
Agriculture	585	836	950	1,052	1,155	1,152	1,193	1,194	1,176	1,185	1,196
Education, training, employment, and social services	468	220	374	433	365	348	373	369	331	370	411
International affairs	125	210	375	378	371	382	254	287	252	190	246
Veterans' benefits and services	126	193	216	219	245	250	265	257	259	267	239
Commerce and housing credit	101	114	140	178	192	220	380	525	432	435	498
Community and regional development	119	50	67	88	95	57	68	70	50	54	46
Administration of justice	45	47	44	51	51	49	46	59	56	67	70
Income security	47	21	33	30	37	36	45	43	16	10	10
General government	22	17	17	4	4	1	0	1	2	2	2
Millions of constant 1992 dollars											
Total	50,150	63,631	68,435	67,796	68,398	68,113	65,077	63,932	62,716	62,877	61,726
National defense	25,204	42,982	42,838	40,461	40,083	40,204	35,966	34,576	34,333	34,570	33,384
Nondefense	24,946	20,649	25,597	27,335	28,315	27,909	29,111	29,356	28,382	28,306	28,341
Health	6,229	6,911	8,914	9,492	10,055	10,019	10,470	10,601	10,778	11,243	11,205
Space research and technology	4,617	3,476	6,186	6,699	6,744	6,811	7,061	7,357	7,124	6,904	6,900
General science	2,079	2,375	2,586	2,711	2,659	2,623	2,583	2,597	2,585	2,624	2,660
Energy	6,076	3,047	2,925	3,038	3,153	2,609	2,736	2,643	2,290	2,001	1,922
Natural resources and environment	1,685	1,351	1,487	1,628	1,688	1,756	1,776	1,848	1,637	1,632	1,640
Transportation	1,496	1,314	1,121	1,266	1,523	1,660	1,798	1,704	1,630	1,618	1,672
Agriculture	987	1,066	1,019	1,082	1,155	1,123	1,136	1,110	1,068	1,050	1,031
Education, training, employment, and social services	789	281	401	445	365	339	355	343	301	328	354
International affairs	211	268	402	389	371	372	242	267	229	168	212
Veterans' benefits and services	212	246	232	225	245	244	252	239	235	236	206
Commerce and housing credit	170	145	150	183	192	214	362	488	392	385	429
Community and regional development	201	64	72	91	95	56	65	45	48	40	40
Administration of justice	76	60	47	52	51	48	44	55	51	59	60
Income security	79	27	35	31	37	35	43	40	15	9	9
General government	37	22	18	4	4	1	0	1	2	2	2

NOTES: Data for 1980-96 are actual budget authority. Data for 1997 and 1998 are preliminary based on the FY 1998 budget. See appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

SOURCE: National Science Foundation, Science Resources Studies Division, *Federal R&D Funding by Budget Function: Fiscal Years 1996-98* (Arlington, VA: forthcoming). See figure 4-28.

Appendix table 4-40.
Federal basic research funding, by budget function: FYs 1980, 1985, and 1990-98

Function	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998
Millions of current dollars											
Total	4,716	7,810	11,288	12,405	12,973	13,440	13,552	13,772	14,443	14,853	15,296
Health	1,761	3,243	4,661	5,021	5,506	5,700	5,889	6,068	6,395	6,826	7,015
General science	1,152	1,779	2,306	2,526	2,532	2,553	2,542	2,622	2,662	2,773	2,886
Space research and technology	482	498	1,389	1,479	1,499	1,588	1,796	1,614	1,685	1,557	1,517
National defense	552	856	964	1,188	1,147	1,323	1,174	1,181	1,165	1,133	1,191
Energy	200	428	761	878	921	917	921	930	1,182	1,219	1,333
Agriculture	246	406	456	486	528	553	567	565	547	545	563
Natural resources and environment	136	206	336	389	383	376	224	187	147	149	157
Transportation	79	255	242	246	266	238	220	389	456	445	429
Education, training, employment, and social services	61	86	106	115	118	121	145	153	140	139	146
Commerce and housing credit	15	23	31	39	35	34	38	35	37	39	40
Veterans' benefits and services	14	15	16	16	16	16	16	16	13	14	14
Administration of justice	9	4	9	6	5	5	5	9	12	12	24
Community and regional development	8	6	3	10	11	10	9	3	0	0	0
General government	-	4	3	0	0	0	0	0	0	0	0
International affairs	0	4	4	6	6	8	6	0	2	2	1
Income security	1	0	0	0	0	0	0	0	0	0	0
Millions of constant 1992 dollars^a											
Total	7,953	9,966	12,111	12,762	12,973	13,101	12,907	12,799	13,118	13,156	13,186
Health	2,970	4,136	5,001	5,166	5,506	5,556	5,609	5,639	5,808	6,046	6,047
General science	1,943	2,269	2,474	2,599	2,532	2,488	2,421	2,437	2,418	2,456	2,488
Space research and technology	813	635	1,490	1,522	1,499	1,548	1,710	1,500	1,530	1,379	1,308
National defense	931	1,092	1,034	1,222	1,147	1,289	1,118	1,098	1,058	1,004	1,027
Energy	337	546	817	903	921	894	877	864	1,074	1,080	1,132
Agriculture	415	518	489	500	528	539	540	525	497	483	485
Natural resources and environment	229	263	361	400	383	366	213	174	134	132	135
Transportation	133	325	260	253	266	232	210	362	414	394	370
Education, training, employment, and social services	103	110	114	118	118	118	138	142	127	123	126
Commerce and housing credit	25	29	33	40	35	33	36	33	34	35	34
Veterans' benefits and services	24	19	17	16	16	16	15	15	12	12	12
Administration of justice	15	5	10	6	5	5	5	8	11	11	21
Community and regional development	13	8	3	10	11	10	9	3	0	0	0
General government	-	5	3	0	0	0	0	0	0	0	0
International affairs	0	5	4	6	6	8	6	0	2	2	1
Income security	2	0	0	0	0	0	0	0	0	0	0

NOTE: Data for 1980-96 are actual budget authority. Data for 1997 and 1998 are preliminary based on the FY 1998 budget.

^aSee appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

SOURCE: National Science Foundation, Science Resources Studies Division, *Federal R&D Funding by Budget Function: Fiscal Years 1996-98* (Arlington, VA: forthcoming).

Appendix table 4-41.

**Distribution of government R&D budget appropriations, by socioeconomic objective: Most recent year
(Percentages)**

Objective	United States (1996)	Japan (1996)	Germany (1995)	France (1996)	United Kingdom (1995)	Italy (1995)	Canada (1995)
Total (millions of U.S. \$)^a	69,049	15,068	15,285	13,255	8,184	6,478	3,264
Agriculture, forestry, and fishing	2.4	3.4	2.6	3.6	4.6	2.7	13.8
Industrial development	0.6	3.8	13.2	4.8	9.3	8.8	10.4
Energy	3.7	19.8	3.5	4.7	0.9	3.1	8.2
Infrastructure	2.7	2.0	1.6	0.5	1.8	0.5	5.1
Transport and telecommunications	2.6	1.7	0.5	NA	0.3	NA	3.9
Urban and rural planning	0.1	0.3	1.1	NA	1.5	NA	1.2
Environmental protection	0.7	0.6	3.5	2.0	2.1	2.4	2.5
Health	17.6	2.8	3.1	5.2	7.7	8.8	8.9
Social development and services	1.0	1.1	2.4	0.9	2.5	2.8	3.7
Earth and atmosphere	1.2	1.3	2.4	0.8	2.2	1.4	1.6
Advancement of knowledge	4.1	52.1	52.8	35.2	24.8	52.8	33.4
Advancement of research	4.1	11.1	14.6	19.2	6.1	8.0	14.1
General university funds	–	41.0	38.2	16.0	18.7	44.8	19.4
Civil space	11.4	7.0	5.1	10.9	2.9	8.7	7.5
Defense	54.7	6.2	9.1	29.0	40.8	4.7	4.8
Not elsewhere classified	0.0	0.0	0.7	2.5	0.4	3.3	0.0

NA = not separately available but included in subtotal; – = the United States does not have an equivalent to general university funds

NOTES: Percentages may not add to 100 because of rounding. U.S. data are based on budget authority. Because of general university funds and slight differences in accounting practices, the distribution of government budgets among socioeconomic objectives may not completely reflect the actual distribution of government-funded research in particular objectives. Japanese data are based on science and technology budget data, which include items other than R&D. Such items are a small proportion of the budget; therefore, the data may still be used as an approximate indicator of relative government emphasis on R&D by objective.

^aConversions of foreign currencies to U.S. dollars are calculated with purchasing power parity exchange rates. (See appendix table 4-2.)

SOURCES: National Science Foundation, Science Resources Studies Division, *Federal R&D Funding by Budget Function: Fiscal Years 1996-98* (Arlington, VA: forthcoming); and Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997).

See figure 4-26.

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Appendix table 4-42.

International R&D expenditures and R&D as a percentage of GDP: 1981-97

	United States	Japan	Germany ^a	France	United Kingdom	Italy	Canada
Total R&D expenditures in billions of constant 1992 U.S. dollars^b							
1981	109.2	35.0	23.8	16.8	17.6	7.0	5.3
1982	114.9	37.6	24.5	18.0	NA	7.2	5.7
1983	122.6	40.5	25.0	18.5	17.0	7.7	5.8
1984	134.3	43.6	25.7	19.6	NA	8.4	6.3
1985	145.5	48.4	28.3	20.4	18.5	9.6	6.8
1986	148.8	49.1	29.2	20.7	19.4	9.9	7.2
1987	151.4	52.5	31.3	21.5	19.7	10.7	7.3
1988	155.0	56.7	32.4	22.5	20.3	11.4	7.4
1989	157.8	62.1	33.8	24.0	20.9	12.0	7.6
1990	162.0	67.2	34.1	25.4	21.3	12.8	8.0
1991	165.0	68.6	36.5	25.7	19.6	13.2	8.1
1992	164.9	69.6	37.2	26.5	20.7	13.6	8.4
1993	161.0	67.4	35.6	25.8	20.7	12.4	8.9
1994	160.5	66.4	35.5	25.2	20.7	11.8	9.2
1995	170.1	70.6	35.4	25.2	19.9	11.8	9.3
1996	175.6	NA	33.1	NA	NA	11.6	9.3
1997	182.2	NA	NA	NA	NA	NA	NA
R&D expenditures as a percentage of GDP							
1981	2.32	2.13	2.43	1.97	2.37	0.88	1.25
1982	2.49	2.22	2.52	2.06	NA	0.91	1.40
1983	2.55	2.35	2.52	2.11	2.19	0.95	1.37
1984	2.61	2.43	2.51	2.21	NA	1.01	1.41
1985	2.74	2.58	2.72	2.25	2.23	1.13	1.45
1986	2.71	2.55	2.73	2.23	2.25	1.13	1.49
1987	2.68	2.62	2.88	2.27	2.19	1.19	1.44
1988	2.64	2.66	2.86	2.28	2.14	1.22	1.39
1989	2.60	2.77	2.87	2.33	2.15	1.24	1.39
1990	2.64	2.85	2.75	2.41	2.18	1.30	1.47
1991	2.71	2.82	2.61	2.41	2.11	1.32	1.52
1992	2.64	2.76	2.48	2.42	2.13	1.31	1.57
1993	2.52	2.68	2.43	2.45	2.15	1.26	1.63
1994	2.43	2.64	2.33	2.38	2.11	1.16	1.62
1995	2.52	2.78	2.28	2.34	2.05	1.14	1.61
1996	2.55	NA	2.26	NA	NA	1.13	1.59
1997	2.59	NA	NA	NA	NA	NA	NA

Appendix table 4-42.

International R&D expenditures and R&D as a percentage of GDP: 1981-97

	United States	Japan	Germany ^a	France	United Kingdom	Italy	Canada
Total R&D expenditures in billions of constant 1992 units of national currency^c							
1981	109.2	6,678.0	52.2	110.0	11.0	10,469.1	6.7
1982	114.9	7,171.3	53.7	117.5	NA	10,841.8	7.3
1983	122.6	7,757.3	54.6	121.3	10.8	11,548.6	7.4
1984	134.3	8,335.2	55.9	128.2	NA	12,576.3	8.0
1985	145.5	9,249.3	61.7	133.4	11.6	14,388.2	8.7
1986	148.8	9,406.9	63.4	135.4	12.2	14,887.0	9.2
1987	151.4	10,055.2	67.8	140.9	12.4	16,103.5	9.3
1988	155.0	10,825.8	70.0	147.2	12.8	17,124.5	9.4
1989	157.8	11,832.1	72.8	156.4	13.1	17,954.5	9.6
1990	162.0	12,820.3	73.7	165.9	13.4	19,161.9	10.2
1991	165.0	13,146.5	78.6	166.7	12.7	19,760.0	10.3
1992	164.9	13,001.1	76.4	169.4	12.7	19,660.7	10.7
1993	161.0	12,655.4	73.9	169.6	13.1	18,698.4	11.4
1994	160.5	12,510.7	72.8	168.5	13.4	17,608.1	11.8
1995	170.1	13,303.9	72.6	169.4	13.3	17,787.7	12.0
1996	175.6	NA	72.7	NA	NA	17,776.9	12.0

NA = not available

^aGerman data before 1991 are for West Germany only.^bConversions of foreign currencies to U.S. dollars are calculated with purchasing power parity exchange rates. Constant 1992 dollars are based on U.S. GDP implicit price deflators. (See appendix tables 4-1 and 4-2.)^cConstant foreign currencies are based on deflation with each countries' GDP implicit price deflators.SOURCES: National Science Foundation, Science Resources Studies Division, *National Patterns of R&D Resources: 1997 Data Update*, <<<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>>; and Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997).

See figures 4-18, 4-19, 4-20, and 4-21.

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Appendix table 4-43.

**R&D as a percentage of GDP in selected former communist countries: 1990-95
(Percentages)**

	Russian Federation	Czech Republic	Hungary	Poland
1990	2.03	NA	NA	NA
1991	1.43	2.12	1.07	NA
1992	0.74	1.83	1.05	NA
1993	0.77	1.35	0.98	NA
1994	0.84	1.25	0.89	0.82
1995	0.73	1.15	0.75	0.74

NA = not available

SOURCES: Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997); and Centre for Science Research and Statistics, *Russian Science and Technology at a Glance: 1996* (Moscow: 1997).

See figure 4-22.

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Appendix table 4-44.

International nondefense R&D expenditures and R&D as a percentage of GDP: 1981-97

	United States	Japan	Germany ^a	France	United Kingdom	Italy	Canada
Total nondefense R&D expenditures in billions of constant 1992 U.S. dollars^b							
1981	81.4	34.8	23.0	13.4	13.7	6.8	5.1
1982	82.6	37.4	23.7	14.5	NA	7.1	5.6
1983	86.3	40.3	24.0	15.2	13.1	7.4	5.6
1984	93.9	43.3	24.7	16.1	NA	8.0	6.1
1985	100.4	48.0	27.1	16.9	14.6	9.1	6.6
1986	101.9	48.8	28.0	17.0	15.6	9.4	7.0
1987	103.3	52.1	29.9	17.5	16.2	10.3	7.0
1988	107.8	56.2	31.0	18.3	17.1	10.8	7.1
1989	113.8	61.6	32.4	19.7	17.6	11.4	7.3
1990	120.9	66.6	32.6	20.5	18.0	12.4	7.7
1991	127.8	67.9	35.0	21.1	16.6	12.7	7.9
1992	129.4	68.9	35.8	22.4	17.8	13.1	NA
1993	126.3	66.5	34.5	22.0	17.8	11.9	8.7
1994	128.6	65.6	34.3	21.7	18.0	11.3	NA
1995	138.3	69.7	34.2	NA	17.2	11.5	9.1
1996	144.4	NA	NA	NA	NA	NA	NA
1997	151.7	NA	NA	NA	NA	NA	NA
Nondefense R&D expenditures as a percentage of GDP							
1981	1.73	2.12	2.34	1.57	1.84	0.85	1.21
1982	1.79	2.21	2.44	1.66	NA	0.89	1.36
1983	1.80	2.34	2.43	1.74	1.69	0.93	1.33
1984	1.83	2.41	2.42	1.82	NA	0.97	1.36
1985	1.89	2.56	2.60	1.87	1.76	1.07	1.41
1986	1.86	2.53	2.61	1.84	1.82	1.08	1.44
1987	1.83	2.60	2.75	1.85	1.79	1.15	1.39
1988	1.84	2.63	2.74	1.85	1.80	1.15	1.34
1989	1.88	2.75	2.75	1.92	1.81	1.18	1.34
1990	1.97	2.83	2.62	1.95	1.84	1.26	1.43
1991	2.10	2.79	2.51	1.98	1.79	1.27	1.49
1992	2.07	2.73	2.39	2.04	1.83	1.27	NA
1993	1.98	2.65	2.35	2.10	1.85	1.21	1.59
1994	1.95	2.60	2.25	2.05	1.84	1.11	NA
1995	2.05	2.74	2.20	NA	1.78	1.11	1.58
1996	2.10	NA	NA	NA	NA	NA	NA
1997	2.15	NA	NA	NA	NA	NA	NA

NA = not available

^aGerman data before 1991 are for West Germany only.^bConversions of foreign currencies to U.S. dollars are calculated with purchasing power parity exchange rates. Constant 1992 dollars are based on U.S. GDP implicit price deflators. (See appendix tables 4-1 and 4-2.)SOURCES: National Science Foundation, Science Resources Studies Division, *National Patterns of R&D Resources: 1997 Data Update*, <<<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>>; and Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997).

See figures 4-19 and 4-21.

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Appendix table 4-45.

International R&D expenditures, by performing sector and source of funds: Mid-1990s

R&D performer	Total	Source of R&D funds				Percent distribution, performers	
		Industry	Government	Higher education	Private nonprofit		
Billions of yen							
Japan, 1995 total	13,358	9,644	2,741	874	83	14	100.0
Industry	9,396	9,223	149	–	10	13	70.3
Government	1,391	10	1,379	1	–	–	10.4
Higher education	1,932	45	1,012	872	3	–	14.5
Private nonprofit	640	366	201	1	70	1	4.8
Percent distribution, sources	100.0	72.2	20.5	6.5	0.6	0.1	
Millions of deutsch marks							
Germany, 1996 total	79,860	48,800	29,430	0	260	1,370	100.0
Industry	53,100	47,250	4,750	–	100	1,000	66.5
Government	11,500	400	10,770	–	160	170	14.4
Higher education	15,260	1150	13,910	–	–	200	19.1
Private nonprofit	–	–	–	–	–	–	0.0
Percent distribution, sources	100.0	61.1	36.9	0.0	0.3	1.7	
Millions of francs							
France, 1994 total	175,563	85,462	73,049	996	1,503	14,553	100.0
Industry	108,568	82,266	14,062	21	33	12,186	61.8
Government	36,217	1,916	32,675	56	27	1,543	20.6
Higher education	28,407	896	26,046	716	104	646	16.2
Private nonprofit	2,369	384	266	203	1,339	178	1.3
Percent distribution, sources	100.0	48.7	41.6	0.6	0.9	8.3	
Millions of pounds							
United Kingdom, 1995 total	14,328	6,877	4,777	117	505	2,052	100.0
Industry	9,379	6,478	1,122	–	–	1,780	65.5
Government	2,076	228	1,752	3	34	59	14.5
Higher education	2,695	167	1,823	114	380	211	18.8
Private nonprofit	177	5	79	–	90	3	1.2
Percent distribution, sources	100.0	48.0	33.3	0.8	3.5	14.3	
Billions of lire							
Italy, 1996 total	20,985	10,380	9,692	0	0	913	100.0
Industry	12,113	10,035	1,427	–	–	651	57.7
Government	4,174	85	3,946	–	–	142	19.9
Higher education	4,698	260	4,318	–	–	120	22.4
Private nonprofit	–	–	–	–	–	–	0.0
Percent distribution, sources	100.0	49.5	46.2	0.0	0.0	4.4	
Millions of Canadian dollars							
Canada, 1996 total	12,939	6,029	4,538	296	343	1,357	100.0
Industry	8,143	5,670	777	–	–	1,321	62.9
Government	1,841	27	1,809	–	–	5	14.2
Higher education	2,775	296	1,901	296	263	18	21.4
Private nonprofit	180	36	51	–	80	13	1.4
Percent distribution, sources	100.0	46.6	35.1	2.3	2.7	10.5	

– = assumed negligible or no data available

SOURCE: Organisation for Economic Co-operation and Development, unpublished tabulations.

See figure 4-23.

Appendix table 4-46.

R&D expenditures in the United States, by performing sector and domestic and foreign source of funds: 1980, 1987, and 1995

(Millions of U.S. dollars)

R&D performer	Total	Source of R&D funds				Percent distribution, performers	
		Industry	Government	Higher education	Private nonprofit		
Total 1980 expenditures	63,076	29,409	29,857	1,382	911	1,517	100.0
Industry	44,505	28,959	14,029	-	-	1,517	70.6
Government	7,831	-	7,831	-	-	-	12.4
Higher education	8,565	250	6,522	1,382	411	-	13.6
Other nonprofit	2,175	200	1,475	-	500	-	3.4
Percent distribution, sources	100.0	46.6	47.3	2.2	1.4	2.4	
Total 1987 expenditures	125,840	58,173	58,253	3,259	1,658	4,497	100.0
Industry	92,155	56,906	30,752	-	-	4,497	73.2
Government	13,588	-	13,588	-	-	-	10.8
Higher education	16,768	811	11,843	3,259	855	-	13.3
Other nonprofit	3,329	456	2,070	-	803	-	2.6
Percent distribution, sources	100.0	46.2	46.3	2.6	1.3	3.6	
Total 1995 expenditures	183,013	96,026	63,147	5,739	3,129	14,972	100.0
Industry	132,103	93,680	23,451	-	-	14,972	72.2
Government	17,231	-	17,231	-	-	-	9.4
Higher education	27,708	1,516	18,839	5,739	1,613	-	15.1
Other nonprofit	5,971	830	3,626	-	1,516	-	3.3
Percent distribution, sources	100.0	52.5	34.5	3.1	1.7	8.2	

- = assumed negligible or no data available

NOTE: Foreign sources represent funding from companies in the United States with foreign ownership of 50 percent or more.

SOURCES: National Science Foundation, Science Resources Studies Division, *National Patterns of R&D Resources: 1997 Data Update*, <<<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>>; and U.S. Bureau of Economic Analysis, unpublished tabulations.

See figure 4-23.

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Appendix table 4-47.

Discrepancy between federal R&D support as reported by performers and by federal agencies: 1980-96
(Billions of dollars)

	All performers			Industrial performers		
	Performer-reported	Agency-reported	Difference	Performer-reported	Agency-reported	Difference
1980	29.9	29.8	0.0	12.8	13.0	-0.2
1981	33.7	33.1	0.6	15.0	14.9	0.1
1982	37.1	36.4	0.7	17.1	17.2	-0.1
1983	41.4	38.7	2.7	19.1	17.0	2.1
1984	46.3	42.2	4.1	21.7	18.6	3.0
1985	52.5	48.4	4.1	25.3	21.7	3.6
1986	54.5	51.4	3.1	26.0	24.2	1.8
1987	58.3	55.3	3.0	28.8	26.8	2.0
1988	59.9	56.8	3.2	28.2	26.7	1.5
1989	60.3	61.4	-1.1	26.4	28.5	-2.2
1990	61.5	63.6	-2.1	25.8	29.4	-3.6
1991	60.6	61.3	-0.7	24.1	26.4	-2.3
1992	60.7	65.6	-4.9	22.4	29.7	-7.4
1993	60.4	67.3	-7.0	20.8	30.2	-9.4
1994	60.7	67.3	-6.6	20.3	30.5	-10.2
1995	63.1	68.8	-5.6	21.2	30.5	-9.3
1996	62.8	69.1	-6.3	20.9	31.3	-10.3

NOTES: Performer-reported data are expenditures, and agency-reported data are obligations. Data for 1996 are preliminary. The differences in the two series are derived from unrounded data, not shown in the table.

SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *National Patterns of R&D Resources: 1997 Data Update*, <<http://www.nsf.gov/sbe/srs/natpat97/start.htm>>; and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997, Detailed Statistical Tables*, NSF 97-327 (Arlington, VA: 1997).

See figure 4-27.

Science & Engineering Indicators – 1998

Appendix table 4-48.
Distribution of strategic technology alliances between and within economic blocs, by technology: 1980-96

	Total ^a			Biotechnology			Information technologies			New materials		
	Total	Inter-region		Intra-region	Inter-region		Intra-region	Inter-region		Total	Inter-region	
		Total	Intra-region		Total	Intra-region		Total	Intra-region		Total	Intra-region
Number of international alliances												
1980	136	60	76	58	22	36	66	33	33	12	5	7
1981	156	66	90	46	13	33	95	46	49	15	7	8
1982	200	108	92	71	27	44	107	68	39	22	13	9
1983	210	106	104	45	20	25	133	69	64	32	17	15
1984	296	134	162	73	27	46	200	97	103	23	10	13
1985	386	160	226	132	54	78	201	84	117	53	22	31
1986	405	151	254	120	37	83	212	91	121	73	23	50
1987	404	164	240	126	56	70	212	83	129	66	25	41
1988	402	152	250	115	39	76	217	96	121	48	17	31
1989	355	148	207	78	37	41	233	92	141	44	19	25
1990	287	122	165	34	17	17	222	86	136	31	19	12
1991	264	119	145	34	17	17	212	95	117	18	7	11
1992	355	149	206	82	42	40	240	93	147	33	14	19
1993	399	165	234	117	50	67	226	92	134	56	23	33
1994	489	203	286	174	83	91	277	105	172	38	15	23
1995	587	244	343	199	98	101	340	122	218	48	24	24
1996	483	201	282	168	95	73	280	95	185	35	11	24
Percentage share, by interregional and intraregional distribution												
1980	100	44	56	100	38	62	100	50	50	100	42	58
1981	100	42	58	100	28	72	100	48	52	100	47	53
1982	100	54	46	100	38	62	100	64	36	100	59	41
1983	100	50	50	100	44	56	100	52	48	100	53	47
1984	100	45	55	100	37	63	100	49	52	100	43	57
1985	100	41	59	100	41	59	100	42	58	100	42	58
1986	100	37	63	100	31	69	100	43	57	100	32	68
1987	100	41	59	100	44	56	100	39	61	100	38	62
1988	100	38	62	100	34	66	100	44	56	100	35	65
1989	100	42	58	100	47	53	100	39	61	100	43	57
1990	100	43	57	100	50	50	100	39	61	100	41	59
1991	100	45	55	100	50	50	100	45	55	100	39	61
1992	100	42	58	100	51	49	100	39	61	100	42	58
1993	100	41	59	100	43	57	100	41	59	100	41	59
1994	100	42	58	100	48	52	100	38	62	100	39	61
1995	100	42	58	100	49	51	100	36	64	100	50	50
1996	100	42	58	100	57	43	100	34	66	100	31	69

Appendix table 4-48.
Distribution of strategic technology alliances between and within economic blocs, by technology: 1980-96

	Total ^a			Biotechnology			Information technologies			New materials		
	Europe-Japan	Europe-U.S.	Japan-U.S.	Number of interregional alliances			Europe-U.S.	Japan-U.S.	Europe-Japan	Europe-U.S.	Japan-U.S.	Europe-U.S.
				Europe-Japan	Europe-U.S.	Japan-U.S.						
1980	5	40	15	0	15	7	5	20	8	0	5	0
1981	10	30	26	1	4	8	7	23	16	2	3	2
1982	15	54	39	2	11	14	9	37	22	4	6	3
1983	18	37	51	2	12	6	12	19	38	4	6	7
1984	19	60	55	0	18	9	14	41	42	5	1	4
1985	26	82	52	7	30	17	13	44	27	6	8	8
1986	26	78	47	1	22	14	19	46	26	6	10	7
1987	16	95	53	5	37	14	6	48	29	5	10	10
1988	15	98	39	1	30	8	11	62	23	3	6	8
1989	18	86	44	7	21	9	8	56	28	3	9	7
1990	22	66	34	3	12	2	15	42	29	4	12	3
1991	15	53	51	1	14	2	12	37	46	2	2	3
1992	17	89	43	3	33	6	12	52	29	2	4	8
1993	16	104	45	2	38	10	10	48	34	4	18	1
1994	18	145	40	5	71	7	12	63	30	1	11	3
1995	23	167	54	7	84	7	12	69	41	4	14	6
1996	16	135	50	6	76	13	9	50	36	1	9	1
				Number of intraregional alliances								
	Europe	Japan	U.S.	Europe	Japan	U.S.	Europe	Japan	U.S.	Europe	Japan	U.S.
1980	29	5	42	10	1	25	13	4	16	6	0	1
1981	30	12	48	8	2	23	18	8	23	4	2	2
1982	27	8	57	6	2	36	17	4	18	4	2	3
1983	33	20	51	9	2	14	17	15	32	7	3	5
1984	59	15	88	14	4	28	40	7	56	5	4	4
1985	105	35	86	38	7	33	60	10	47	7	18	6
1986	78	58	118	15	16	52	52	15	54	11	27	12
1987	69	38	133	18	9	43	46	7	76	5	22	14
1988	86	23	141	31	5	40	48	7	66	7	11	13
1989	74	11	122	16	2	23	45	7	89	13	2	10
1990	34	10	121	5	0	12	25	9	102	4	1	7
1991	29	10	106	2	0	15	24	9	84	3	1	7
1992	41	10	155	10	1	29	25	9	113	6	0	13
1993	35	7	192	10	2	55	14	4	116	11	1	21
1994	39	12	235	25	1	65	9	9	154	5	2	16
1995	54	8	281	27	1	73	22	4	192	5	3	16
1996	43	11	228	20	0	53	18	8	159	5	3	16

^aIncludes all agreements reported for biotechnology, information technologies, and new materials.

SOURCE: J. Hagedoorn, Maastricht Economic Research Institute on Innovation and Technology, Cooperative Agreements and Technology Indicators database, unpublished tabulations.

See figures 4-31 and 4-32.

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Appendix table 4-49.

Proportion of industrial R&D expenditures financed from foreign sources, by selected country: 1980-96
 (Percentages)

	Canada	France	Germany ^a	Italy	Japan	United Kingdom	United States
1980	NA	NA	NA	NA	NA	NA	3.4
1981	7.4	7.0	1.2	4.3	0.1	8.7	NA
1982	10.7	4.8	1.3	4.7	0.1	NA	NA
1983	16.6	4.6	1.4	4.3	0.1	6.8	NA
1984	17.1	6.5	1.5	6.2	0.1	NA	NA
1985	14.3	6.9	1.4	6.1	0.1	11.1	NA
1986	13.6	8.0	1.4	7.3	0.1	12.2	NA
1987	16.8	8.7	1.5	6.9	0.1	12.0	4.9
1988	18.0	9.2	2.1	6.6	0.1	12.0	5.7
1989	16.7	10.9	2.7	6.5	0.1	13.4	6.6
1990	17.4	11.1	2.7	7.3	0.1	15.5	7.8
1991	18.0	11.4	2.6	8.6	0.1	16.0	7.8
1992	NA	12.0	2.5	5.4	0.1	15.0	9.0
1993	17.2	11.3	1.9	5.9	0.1	15.4	9.6
1994	17.0	11.2	2.0	8.1	0.1	16.0	10.6
1995	NA	NA	1.9	5.4	0.1	19.0	11.3
1996	17.0	NA	1.9	5.4	NA	NA	NA

NA = not available

NOTE: There are no data on foreign sources of U.S. industrial R&D performance. The figures shown here to approximate such foreign involvement are the estimated percentages of U.S. industrial performance undertaken by majority-owned (that is, 50 percent or more) nonbank U.S. affiliates of foreign companies.

^aGerman data before 1991 are for West Germany only.

SOURCES: U.S. Bureau of Economic Analysis, unpublished tabulations; and Organisation for Economic Co-operation and Development, Main Science and Technology Indicators database (Paris: August 1997).

See figure 4-24.

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Appendix table 4-50.
Company-financed R&D performed abroad by U.S. companies and their foreign subsidiaries, by industry: 1985-95

Industry	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Millions of current U.S. dollars											
Total											
Food, kindred, and tobacco products											
Chemicals and allied products	75	69	5,226	6,208	6,706	7,952	9,147	10,063	9,565	9,395	13,052
Industrial and other chemicals	843	1,071	1,243	1,548	1,532	2,007	2,401	2,676	2,833	2,456	4,194
Drugs and medicines	444	579	625	855	609	720	1,009	1,045	1,318	917	1,632
Petroleum refining and extraction	399	492	618	693	923	1,287	1,392	1,631	1,561	1,539	2,562
Stone, clay, and glass products	D	D	D	D	D	47	76	107	119	104	111
Primary metals	D	D	18	23	24	D	59	38	41	38	27
Fabricated metal products	21	26	40	D	D	95	86	20	18	12	15
Machinery	689	951	1,233	1,326	1,432	1,451	1,476	1,439	1,439	1,439	1,439
Electrical equipment	591	D	432	591	573	770	651	568	525	495	495
Transportation equipment	1,025	D	D	1,750	1,916	2,055	2,402	D	D	D	D
Professional and scientific instruments	169	212	317	404	474	611	656	685	751	900	988
Nonmanufacturing industries	18	27	64	146	256	415	778	835	1,770	1,500	2,206
Millions of constant 1992 U.S. dollars^a											
Total											
Food, kindred, and tobacco products											
Chemicals and allied products	95	86	45	31	47	44	68	88	109	111	132
Industrial and other chemicals	1,073	1,329	1,496	1,798	1,707	2,143	2,467	2,676	2,761	2,340	3,899
Drugs and medicines	565	718	752	993	679	769	1,037	1,045	1,284	874	1,517
Petroleum refining and extraction	508	610	744	805	1,029	1,374	1,430	1,631	1,521	1,466	2,382
Stone, clay, and glass products	D	D	D	D	57	69	52	81	110	119	106
Primary metals	D	D	22	27	D	D	63	39	41	37	29
Fabricated metal products	27	32	48	D	D	101	88	109	116	119	103
Machinery	877	1,180	1,484	1,540	1,596	1,550	1,517	1,439	331	293	466
Electrical equipment	752	D	520	686	639	822	669	568	512	472	811
Transportation equipment	1,305	D	D	2,032	2,135	2,195	2,468	D	D	D	D
Professional and scientific instruments	215	263	382	469	528	653	674	685	732	857	919
Nonmanufacturing industries	23	34	77	170	285	443	799	835	1,725	1,429	2,051

Appendix table 4-50.
Company-financed R&D performed abroad by U.S. companies and their foreign subsidiaries, by industry: 1985-95

Industry	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Percentage of domestic funding													
												Total	Food, kindred, and tobacco products	Chemicals and allied products	Industrial and other chemicals	Drugs and medicines	Petroleum refining and extraction	Stone, clay, and glass products	Primary metals	Fabricated metal products	Machinery	Electrical equipment	Transportation equipment	Professional and scientific instruments	Nonmanufacturing industries
Total	6.4	7.7	8.5	9.3	9.1	9.7	10.1	10.7	10.1	9.7	10.1	9.7	12.0												
Food, kindred, and tobacco products	6.6	5.4	3.1	2.3	3.4	3.3	5.2	6.3	8.3	7.9	8.3	7.9	9.1												
Chemicals and allied products	10.1	12.4	13.2	14.3	12.8	15.2	16.6	17.7	17.0	14.8	17.0	14.8	24.2												
Industrial and other chemicals	9.2	11.6	11.7	14.4	9.5	9.9	13.5	14.6	17.5	13.2	17.5	13.2	22.9												
Drugs and medicines	11.5	13.5	15.1	14.1	16.7	21.8	20.0	20.6	17.1	16.0	17.1	16.0	25.1												
Petroleum refining and extraction	2.1	2.0	2.5	3.0	2.2	3.3	4.3	5.2	4.9	5.7	5.2	4.9	4.3												
Stone, clay, and glass products	D	D	D	D	D	D	D	D	D	D	D	D	7.0												
Primary metals	D	D	D	2.5	3.7	3.6	3.6	2.8	3.5	1.9	2.2	2.2	4.5												
Fabricated metal products	2.7	3.3	6.3	D	D	D	D	D	D	D	D	D	14.4												
Machinery	6.4	8.9	11.7	11.1	10.7	10.7	10.8	10.4	10.4	4.1	4.1	3.8	5.2												
Electrical equipment	6.4	D	4.1	5.9	6.0	8.3	7.3	6.0	4.5	3.7	4.5	3.7	5.1												
Transportation equipment	8.5	D	D	12.6	13.1	14.4	16.2	D	D	D	D	D	D												
Professional and scientific instruments	3.7	4.5	6.4	7.6	8.3	9.7	9.6	9.4	10.0	11.2	11.2	11.6													
Nonmanufacturing industries	0.4	0.6	1.2	2.0	2.5	2.5	3.4	3.6	7.2	6.3	6.3	8.0													

D = withheld to avoid disclosing operations of individual companies

^aSee appendix table 4-1 for GDP implicit price deflators used to convert current dollars to constant 1992 dollars.

SOURCE: National Science Foundation, Science Resources Studies Division, *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming).

See figure 4-35.

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Appendix table 4-51.

**Expenditures for R&D performance for majority-owned foreign affiliates of U.S. parent companies, by region/country:
1982 and 1989-94**
(Millions of U.S. dollars)

Region/country	1982	1989	1990	1991	1992	1993	1994
Total	3,647	7,048	10,187	9,396	11,084	10,951	11,482
Canada.....	545	914	1,159	1,039	1,006	1,025	852
Europe.....	2,591	5,178	7,952	7,143	8,024	7,533	8,255
Belgium	181	317	388	383	458	455	523
France	263	545	882	907	1,021	941	1,249
Germany	893	1,496	2,561	2,504	2,726	2,567	3,216
Ireland	31	134	539	573	664	664	464
Italy	136	294	476	327	326	304	389
Netherlands	101	360	459	478	482	393	260
Spain	36	115	103	100	323	320	D
Sweden	29	33	130	83	84	48	67
Switzerland	51	67	76	91	101	109	145
United Kingdom	805	1,673	2,221	1,606	1,737	1,634	1,706
Other European countries	65	144	117	91	102	98	D
Asia and Pacific	294	760	846	916	1,719	1,964	1,817
Japan	104	488	512	596	664	881	1,088
Australia	120	181	197	144	173	175	225
Singapore	D	25	54	87	360	312	243
Other Asian and Pacific countries	D	66	83	89	522	596	261
Latin America and other Western Hemisphere	179	153	201	253	291	383	502
Brazil	96	90	113	149	172	220	253
Mexico	38	37	53	64	76	D	189
Other Latin America	45	26	35	40	43	D	60
Middle East	11	32	16	30	25	28	38
Africa	26	11	13	15	19	18	19
South Africa	23	9	10	12	16	14	14
Other African countries	3	2	3	3	3	4	5

D = withheld to avoid disclosing operations of individual companies

NOTES: The data include foreign direct investments of nonbank U.S. affiliates conducted by and for the foreign affiliates. The data exclude expenditures for R&D conducted for others under a contract. Benchmark survey statistics are reported for 1982, 1989, and 1994. Data are preliminary for 1994. Expenditures reported here differ from the data in appendix table 4-50.

SOURCE: U.S. Bureau of Economic Analysis, *U.S. Direct Investment Abroad: Operations of U.S. Parent Companies and Their Foreign Affiliates* (Washington, DC: U.S. Government Printing Office, annual series).

See figures 4-33, 4-34, and 4-36.

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Appendix table 4-52.
Foreign R&D expenditures in the United States, by industry and region/country: 1980-95
 (Millions of current U.S. dollars)

Industry and region/country	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	
Total	1,946	3,110	3,744	4,164	4,738	5,240	5,804	6,521	7,834	9,465	11,522	11,872	13,864	14,199	15,566	17,666	
Expenditures by industry																	
Petroleum	D	253	255	310	366	388	380	311	364	387	520	438	586	428	407	387	
Manufacturing	D	2,645	3,133	3,553	4,058	4,478	5,011	5,573	6,903	8,398	9,868	10,177	11,383	11,842	12,970	14,743	
Food and kindred products	19	32	39	44	43	51	54	58	106	187	192	195	245	266	294	301	
Chemicals and allied products	834	1,580	1,870	2,037	2,349	2,627	2,782	3,220	3,719	4,371	5,243	5,755	D	6,580	7,003	8,326	
Industrial chemicals	454	1,085	1,329	1,397	1,620	1,836	1,657	1,899	2,126	2,284	2,498	2,391	D	1,906	1,993	2,540	
Other chemicals	146	179	170	181	200	228	167	230	276	252	372	427	490	442	504	531	
Drugs and medicines	234	316	371	459	529	563	958	1,091	1,318	1,835	2,373	2,937	3,211	4,232	4,506	5,255	
Primary metal industries	24	71	79	59	66	102	97	91	102	155	166	189	173	201	170	172	
Fabricated metal products	21	20	28	82	54	64	76	67	106	209	152	145	D	172	178	176	
Machinery, except electrical	189	284	297	350	355	342	286	476	692	1,070	1,190	1,094	1,098	1,019	954	1,089	
Office and computing machines	NA	370	497	622	794	788	624	479	552								
Other	NA	106	195	448	396	306	324	475	537								
Electrical equipment	318	385	505	613	799	977	1,366	1,105	1,389	1,371	1,817	1,647	1,953	2,168	2,613	2,770	
Transportation equipment	101	136	150	92	95	83	124	76	225	265	193	207	D	266	375	478	
Professional and scientific instruments	32	52	47	42	42	58	112	279	242	366	420	472	D	581	671	682	
Nonmanufacturing industries	D	212	356	301	314	374	413	637	567	680	1,134	1,257	1,895	1,929	2,189	2,536	
Services	37	43	41	51	60	54	77	243	69	108	384	358	744	932	996	922	
Other	D	169	315	250	254	320	336	394	498	572	750	899	1,151	997	1,193	1,614	
Expenditures by region/country																	
Canada	135	777	1,032	1,212	1,405	1,550	1,542	1,666	1,804	1,758	1,944	2,060	2,113	2,159	2,332	1,396	
Europe	1,544	1,936	2,229	2,324	2,632	2,918	3,450	3,881	4,754	6,022	7,520	7,785	8,993	9,362	10,313	13,370	
United Kingdom	312	405	520	559	664	748	764	833	1,171	1,645	1,889	2,046	2,177	2,211	2,499	2,419	
Germany	380	436	529	591	602	671	851	1,139	1,242	1,503	1,764	1,720	2,100	2,209	2,425	3,976	
France	146	204	232	215	261	166	352	366	435	572	812	953	1,204	1,235	1,449	1,644	
Netherlands	299	373	397	387	432	514	517	542	618	703	784	663	696	697	736	838	
Switzerland	338	416	447	463	546	625	744	765	962	1,195	1,669	1,849	2,064	2,423	2,444	3,088	
Sweden	36	53	54	62	63	116	141	128	166	214	281	237	308	200	289	807	
Other European countries	33	49	50	47	64	78	81	108	160	190	321	317	444	387	471	598	
Japan	88	142	141	171	210	267	292	307	571	822	1,307	1,353	1,709	1,801	1,790	1,867	
Latin America	D	D	D	401	423	427	427	391	352	400	386	397	580	539	637	280	
All other countries	D	D	D	D	56	68	78	93	276	353	463	365	277	469	338	494	

D = withheld to avoid disclosing operations of individual companies; NA = not available

NOES: The data include foreign direct investments of nonbank U.S. affiliates with 10 percent or more foreign ownership and exclude expenditures for R&D conducted for others under a contract

SOURCE: U.S. Bureau of Economic Analysis, *Foreign Direct Investment in the United States: Operations of U.S. Affiliates of Foreign Companies* (Washington, DC: U.S. Government Printing Office, annual series).

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Appendix table 4-53.

R&D expenditures in the United States by majority-owned nonbank U.S. affiliates of foreign companies, by industry of affiliate and country of ultimate beneficial owner: 1980 and 1987-95
 (Millions of current U.S. dollars)

Industry and region/country	1980	1987	1988	1989	1990	1991	1992	1993	1994	1995
Total	1,517	4,497	5,485	6,720	8,511	9,127	10,745	11,262	12,671	14,972
Expenditures by industry										
Petroleum	175	283	339	378	D	D	551	420	400	382
Manufacturing	1,245	3,809	4,773	5,915	7,282	7,839	9,056	9,560	10,855	12,913
Food and kindred products	19	58	105	185	189	190	240	260	283	294
Chemicals and allied products	733	D	D	3,832	4,266	4,692	5,167	5,654	5,654	7,298
Industrial and other chemicals	501	D	D	1,465	D	D	D	1,429	1,429	2,919
Drugs and medicines	232	1,075	1,293	1,806	2,367	D	D	D	4,225	4,379
Rubber products	8	50	98	117	155	150	305	216	210	211
Stone, clay, and glass products	10	32	61	62	114	102	113	106	151	157
Primary metal industries	D	38	37	75	69	82	79	83	77	71
Fabricated metal products	D	62	100	201	138	132	136	155	165	162
Machinery, except electrical	92	D	446	556	645	602	609	529	551	636
Computer and office equipment	28	D	285	295	380	341	328	247	203	248
Other	65	79	161	260	264	261	281	282	348	388
Electrical and electronic equipment	285	D	1,114	1,078	1,533	1,562	1,880	2,061	2,549	2,704
Household audio & video, and comm. equip	66	555	777	721	971	959	1,129	1,133	1,345	1,515
Electronic components and other	219	D	337	357	562	603	752	928	1,204	1,189
Transportation equipment	10	D	D	D	106	159	203	231	331	434
Professional and scientific instruments	28	254	210	295	333	411	556	524	578	593
Nonmanufacturing industries	97	405	373	427	D	D	1,138	1,282	1,416	1,677
Services	5	59	42	77	D	D	211	420	455	430
Wholesale trade	69	312	300	297	571	682	803	745	839	1,113
Motor vehicles and equipment	D	86	67	71	283	277	252	220	182	179
Electrical goods	5	71	107	D	145	224	220	157	236	336
Other	23	34	31	53	D	D	124	117	122	134

Appendix table 4-53.

R&D expenditures in the United States by majority-owned nonbank U.S. affiliates of foreign companies, by industry of affiliate and country of ultimate beneficial owner: 1980 and 1987-95
 (Millions of current U.S. dollars)

Industry and region/country	1980	1987	1988	1989	1990	1991	1992	1993	1994	1995
	Expenditures by region/country									
Canada	113	D	D	D	D	D	D	D	D	D
Europe	1,217	3,458	4,241	5,414	6,762	7,275	8,325	8,628	9,487	11,350
France	39	332	402	510	766	913	1,230	1,190	1,383	11,609
Germany	281	824	963	1,216	1,435	1,596	1,855	2,003	2,147	1,572
Italy	D	D	73	93	151	143	91	132	157	3,663
Netherlands	D	540	615	690	757	642	685	674	719	180
Sweden	D	124	160	205	271	225	322	180	263	816
Switzerland	329	D	D	1,060	1,455	1,637	1,873	2,117	2,127	D
United Kingdom	247	790	1,085	1,568	1,809	1,987	2,090	2,139	2,428	2,471
Other European countries	16	47	D	72	118	132	179	193	263	2,315
Asia and Pacific	D	179	345	412	796	834	1,080	1,232	1,397	D
Japan	D	133	282	369	709	741	938	1,112	1,200	1,281
Other	D	46	63	43	87	93	142	120	197	365
Latin America & other Western Hemisphere	155	329	302	352	314	330	534	D	610	274
Middle East	2	14	9	10	9	9	20	38	62	71
Africa	D	D	D	D	D	D	4	5	2	D

D = withheld to avoid disclosing operations of individual companies

NOTES: The data include foreign direct investments of nonbank U.S. affiliates with 50 percent or more foreign ownership. These R&D expenditures are a subset of total foreign R&D expenditures reported in appendix table 4-52. The data exclude expenditures for R&D conducted for others under a contract.

SOURCE: U.S. Bureau of Economic Analysis, unpublished tabulations.

See figures 4-33, 4-34, and 4-37.

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Appendix table 4-54.

Support for R&D and R&D plant from state government sources: 1995

	Support for R&D and R&D plant (thousand \$)	Ranking	Dollars per capita	Ranking	Share state spending (percent)	Ranking
Total states	2,514,169		9.59		0.35	
Alabama	230	50	0.05	50	0.00	50
Alaska	5,167	42	8.56	27	0.11	39
Arizona	68,627	12	16.27	10	0.68	6
Arkansas	2,142	43	0.86	44	0.03	44
California	248,756	1	7.87	29	0.29	27
Colorado	24,135	24	6.44	33	0.30	24
Connecticut	6,986	40	2.13	41	0.06	41
Delaware	7,240	39	10.10	18	0.22	32
Florida	245,154	2	17.31	7	0.63	8
Georgia	183,526	4	25.49	4	1.02	3
Hawaii	35,406	23	29.83	2	0.57	9
Idaho	14,304	29	12.30	12	0.52	12
Illinois	105,513	7	8.92	24	0.40	17
Indiana	23,838	25	4.11	37	0.20	34
Iowa	49,240	17	17.33	6	0.54	10
Kansas	80,907	10	31.54	1	1.09	2
Kentucky	5,462	41	1.42	42	0.05	42
Louisiana	12,338	32	2.84	40	0.08	40
Maine	12,140	34	9.78	19	0.32	23
Maryland	48,983	18	9.72	21	0.34	21
Massachusetts	21,803	27	3.59	38	0.12	38
Michigan	58,959	15	6.17	34	0.22	31
Minnesota	23,671	26	5.13	36	0.17	35
Mississippi	1,743	44	0.65	47	0.03	47
Missouri	55,448	16	10.41	17	0.48	13
Montana	10,456	37	12.02	13	0.45	15
Nebraska	45,816	19	27.99	3	1.12	1
Nevada	984	45	0.64	48	0.03	46
New Hampshire	10,584	36	9.22	22	0.46	14
New Jersey	69,009	11	8.69	26	0.30	25
New Mexico	12,846.69	31	7.62	30	0.21	33
New York	149,597	6	8.25	28	0.24	30
North Carolina	100,161	8	13.92	11	0.54	11
North Dakota	15,676	28	24.46	5	0.89	4
Ohio	82,989	9	7.44	31	0.28	28
Oklahoma	9,977	38	3.04	39	0.13	37
Oregon	35,677	22	11.36	15	0.33	22
Pennsylvania	204,850	3	16.97	8	0.65	7
Rhode Island	746	47	0.75	46	0.02	48
South Carolina	40,529	21	11.03	16	0.38	20
South Dakota	12,324	33	16.91	9	0.74	5
Tennessee	755	46	0.14	49	0.01	49
Texas	169,570	5	9.06	23	0.43	16
Utah	13,936	30	7.14	32	0.29	26
Vermont	490	49	0.84	45	0.03	45
Virginia	64,707	13	9.78	20	0.38	19
Washington	64,021	14	11.79	14	0.39	18
West Virginia	11,138	35	6.09	35	0.13	36
Wisconsin	45,033	20	8.79	25	0.28	29
Wyoming	557	48	1.16	43	0.03	43

NOTE: These are preliminary tabulations subject to revision and refinement.

SOURCE: Battelle Memorial Institute and the State Science and Technology Institute, *Survey of State Research and Development Expenditures: FY 1995* (Columbus, OH: forthcoming).

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Appendix table 4-55.
State R&D expenditures, by performing sector and source of funds: 1995
 (Millions of current dollars)

Performing sector:	Total R&D		Industry		Universities & colleges				U&C FFRDCS		Other nonprofit institutions ^a		Nonprofit FFRDCS	
	Federal Govt.		Federal Govt. ^b		Federal Govt.		Nonfederal govt.		Federal Govt.		Federal Govt.		Federal Govt.	
	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.	Total	Federal Govt.
State	Rank													
United States, total	183,013	17,343	132,103	23,451	108,652	22,101	13,331	1,655	1,492	4,024	1,599	5,405	2,806	831
Alabama	1,681	642	686	273	413	335	190	7	29	87	22	0	18	0
Alaska	47	163	61	30	D	72	37	6	5	24	0	0	1	0
Arizona	24	1,995	178	1,356	620	380	210	8	23	126	12	75	6	0
Arkansas	44	330	58	181	D	88	33	24	8	20	3	0	3	0
California	1	36,133	1,844	28,710	6,925	21,785	2,594	1,797	107	120	373	198	2,378	362
Colorado	20	2,603	168	1,865	274	1,591	394	260	22	24	52	35	125	46
Connecticut	13	4,311	18	3,906	389	3,517	377	228	19	20	78	32	0	10
Delaware	28	1,149	15	1,077	12	1,065	53	27	2	4	15	5	0	3
District of Columbia	18	3,128	2,106	672	17	656	181	133	1	13	20	15	0	169
Florida	12	5,223	554	4,101	1,634	2,467	559	317	41	36	135	29	0	8
Georgia	23	2,113	272	1,175	142	1,031	658	302	54	55	222	25	0	8
Hawaii	38	509	402	14	D	D	78	44	27	0	4	3	0	15
Idaho	32	914	28	827	D	D	59	20	14	7	16	2	0	1
Illinois	7	7,487	81	5,776	146	5,630	818	468	47	43	195	65	771	41
Indiana	17	3,163	62	2,721	382	2,339	376	197	22	35	101	20	0	4
Iowa	27	1,391	37	998	D	D	323	164	47	19	78	15	32	1
Kansas	34	764	12	569	D	D	181	70	39	11	53	8	0	1
Kentucky	36	594	6	452	4	448	135	60	10	17	44	5	0	1
Louisiana	41	423	45	61	D	D	315	136	72	21	66	19	0	2
Maine	42	345	4	286	D	D	32	16	2	4	9	1	0	23
Maryland	9	6,519	4,159	1,075	287	788	1,160	895	76	55	85	50	0	123
Massachusetts	4	9,969	316	7,416	1,458	5,958	1,147	825	13	89	92	128	345	587
Michigan	2	13,275	82	12,388	148	12,240	755	418	49	51	181	57	0	50
Minnesota	19	3,087	30	2,636	315	2,321	337	195	50	23	46	23	0	85
Mississippi	45	315	133	66	D	D	113	63	24	9	11	6	0	3
Missouri	21	2,499	55	2,028	584	1,443	397	213	21	37	93	33	0	18
Montana	48	119	34	17	D	D	67	27	13	6	20	1	0	2
Nebraska	43	336	23	150	D	D	157	55	42	11	46	3	0	6
Nevada	40	445	35	322	D	D	87	48	6	7	25	1	0	1
New Hampshire	35	598	31	472	36	436	93	60	4	4	13	12	0	2
New Jersey	5	9,128	344	8,200	197	8,002	443	209	40	26	136	33	126	11
New Mexico	15	3,295	481	1,461	1,380	81	230	157	17	11	39	7	1,109	6
New York	3	10,954	117	8,651	1,821	6,831	1,702	1,107	96	98	206	195	281	203
North Carolina	16	3,191	220	2,226	15	2,212	687	432	98	74	62	21	0	59
North Dakota	49	98	25	12	D	D	60	28	2	3	25	2	0	1
Ohio	10	5,314	599	4,001	574	3,428	643	375	48	54	107	59	0	72
Oklahoma	37	529	45	288	38	249	186	60	20	11	79	17	0	9
Oregon	30	1,089	56	741	35	706	259	158	30	12	37	21	0	33
Pennsylvania	8	6,919	228	5,331	376	4,955	1,140	754	35	120	164	66	32	189
Rhode Island	33	896	254	520	D	D	106	72	3	2	26	2	0	17

Appendix table 4-55.
State R&D expenditures, by performing sector and source of funds: 1995
(Millions of current dollars)

State	Rank		Performing sector:		Funding sector:		Industry			Universities & colleges			U&C			Nonprofit FFRDCS	
			Total R&D	Federal Govt.	Total R&D	Federal Govt.	Federal Govt. ^b	Industry ^b	Total	Federal Govt.	Nonfederal govt.	Industry	U&C	Nonprofits	Federal Govt. ^c	Federal Govt.	
South Carolina	31	996	34	739	D	D	220	109	18	19	54	19	0	3	0		
South Dakota	51	55	13	19	0	19	21	11	7	0	2	1	0	1	0		
Tennessee	26	1,402	62	1,003	D	D	308	192	35	16	45	20	10	20	0		
Texas	6	8,385	538	6,211	912	5,298	1,472	748	159	102	297	167	0	163	1		
Utah	29	1,144	131	803	178	625	202	141	15	9	28	9	0	8	0		
Vermont	46	308	5	248	D	D	54	33	2	5	10	4	0	1	0		
Virginia	14	3,897	1,581	1,577	743	834	447	262	47	46	64	28	74	42	177		
Washington	11	5,241	160	4,294	D	D	486	340	14	39	77	15	0	96	205		
West Virginia	39	475	140	243	D	D	53	30	2	3	13	4	33	6	0		
Wisconsin	22	2,226	40	1,706	33	1,673	473	271	43	17	92	51	0	7	0		
Wyoming	50	87	9	25	D	D	40	15	3	2	17	3	0	13	0		
Other/unknown		5,805	771	1,772	3,502	8,875	548	320	53	30	114	30	16	248	26		

FFRDCs = federally funded research and development centers; U&C = universities and colleges; D = data have been withheld to avoid disclosing information about individual companies

NOTES: Data are based on annual reports by performers, except for the nonprofit sector. Details may not sum to totals because of rounding.

^aState data for nonprofit performance using nonfederal funds are not available. For 1995, total nonprofit performance is estimated at \$5,152 million. Industry provided an estimated \$330 million to the nonprofit sector, and nonprofit institutions provided an estimate \$1,516 million. These amounts are included in the total R&D "other/unknown" category.

^bFederal support for industry R&D includes performance at industry FFRDCs; industry support of industry R&D includes all nonfederal sources.

^cIncludes total R&D expenditures of FFRDCs administered by academic institutions.

SOURCES: National Science Foundation, Science Resources Studies Division (NSF/SRS), *Research and Development in Industry: 1995* (Arlington, VA: 1998, forthcoming); NSF/SRS, *Academic Science and Engineering R&D Expenditures: Fiscal Year 1995*, Detailed Statistical Tables (Arlington, VA: 1998, forthcoming); and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, Detailed Statistical Tables, NSF 97-327 (Arlington, VA: 1997).

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Appendix table 4-56.
Annual aggregate data on independent research and development: FYs 1963-96
(Millions of current dollars)

Incurred by industry	Accepted by government IR&D program			Not reimbursed	Not accepted under IR&D program	R&D obligations ^a			Percent of R&D performed by industry with funding from: ^b
	Total accepted	DOD share	NASA share			DOD to industry	DOD and NASA IR&D reimbursement	NASA to industry	
1963	439	255	197	24	184	221	5,173	2,307	3.8
1964	419	272	199	50	23	249	4,880	3,369	4.1
1965	439	300	198	60	42	258	4,362	3,853	4.5
1966	502	357	224	69	64	293	4,557	3,928	4.9
1967	591	439	277	58	104	152	5,428	3,798	5.1
1968	776	579	338	61	180	197	399	5,090	3,382
1969	808	653	410	43	200	155	453	5,157	4.7
1970	753	597	376	44	177	156	420	2,899	5.6
1971	703	567	354	41	172	136	395	4,524	2,521
1972	936	725	392	40	293	211	432	4,629	2,077
1973	1,164	876	441	40	395	288	481	5,108	1,960
1974	1,175	921	467	39	415	254	506	5,138	1,961
1975	1,224	1,010	493	40	477	214	533	5,173	1,785
1976	1,388	1,061	544	41	476	327	585	6,019	2,042
1977	1,560	1,199	598	46	555	361	644	6,997	2,002
1978	1,788	1,365	643	49	673	423	692	7,317	2,043
1979	2,104	1,517	708	54	755	587	762	7,695	2,270
1980	2,373	1,728	812	57	859	645	869	9,022	2,790
1981	2,796	2,039	1,056	66	917	757	1,122	10,826	2,096
1982	3,654	2,821	1,338	67	1,416	833	1,405	13,795	2,002
1983	4,017	2,961	1,601	78	1,282	1,056	1,679	14,541	2,043
1984	5,173	3,897	1,884	86	1,927	1,276	1,970	15,967	2,270
1985	5,036	3,500	2,099	88	1,313	1,536	2,187	18,944	2,426
1986	5,042	3,537	2,198	77	1,262	1,505	2,275	21,502	2,426
1987	4,885	3,544	2,186	67	1,291	1,341	2,253	23,934	2,426
1988	4,825	3,694	2,181	89	1,424	1,131	2,210	23,954	2,426
1989	4,866	3,798	2,233	110	1,455	1,068	2,343	24,734	2,426
1990	4,910	3,766	2,158	131	1,477	1,144	2,289	24,443	2,426
1991	5,099	4,327	2,203	133	1,991	772	2,336	21,034	2,426
1992	4,903	4,320	2,117	84	2,119	583	2,201	24,107	2,426
1993	3,337	3,085	1,904	151	1,030	252	2,055	23,654	2,426
1994	3,068	2,842	1,740	167	929	226	1,913	23,408	2,426
1995	2,848	2,720	1,619	167	934	128	1,786	22,553	2,426
1996	2,863	2,863	1,768	172	923	168	1,940	24,395	2,426

DOD = Department of Defense; IR&D = independent research and development; NASA = National Aeronautics and Space Administration

NOTES: The significant decrease in reported statistics between FYs 1992 and 1993 is primarily due to (1) change in the Federal Acquisition Regulations definition of "major contractor" and (2) change in the Defense Contract Audit Agency criteria used in determining contractors to be reported. Previously, these criteria included contractors with auditable costs of \$40 million or more; the current threshold is \$70 million or more. The increase in the percentage of IR&D costs accepted is due to an expansion of the activities eligible for reimbursement.

^aIncludes R&D performed by federally funded research and development centers administered by the industrial sector.

^bPercentages were calculated as follows: numerator in (1) is total DOD and NASA R&D performed by industry, excluding IR&D, and denominator is total DOD and NASA R&D performed by industry, excluding IR&D.

SOURCES: Defense Contract Audit Agency, *Independent Research and Development and Bid and Proposal Costs Incurred by Major Defense Contractors 1976-96* (Washington, DC: annual series); NASA, unpublished tabulations; J. Reppy, "Defense Payments for Company-Financed R&D," *Research Policy* Vol. 6, No. 4 (October 1977); p. 403; National Science Foundation, *Science Resources Studies Division (NSF/SRS), Federal Funds for Research and Development, Detailed Historical Tables: Fiscal Years 1956-1996*; NSF 96-320 (Arlington, VA: 1996); and NSF/SRS, *Federal Funds for Research and Development: Fiscal Years 1995, 1996, and 1997*, *Detailed Statistical Tables*, NSF 97-327 (Arlington, VA: 1997).